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GEOGRAPHICAL INDEX OF THAILAND

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FOREWORD

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INTRODUCTION

In 1933, thirty years ago, the Commission for Improving the Dictionary noted that in large English-language dictionaries there is usually a world index, inserted as an appendix, giving the names of villages, towns, mountains, etc. and including an index of geographical place-names These indices, which sometimes contain extensive entries and sometimes are abridged, are at times published as volumes separate from the dictionaries. Some of these geographical indices are published for single countries only, as geographical references; but these are reference manuals, not dictionaries. It anyone is interested in learning the location and features of the Bay of Krasu, the Chabang Peninsula or the Isle of Khangkhao and has never visited them or had much contact with them, he cannot gain this information from a dictionary. However, with a geographical index he is immediately able to learn what and where the Tako Pass is and what its historical significance is. In the past, geography books have been the first place to look up such information, and if it was not available there, queries have been directed to employees of the Thai Ministry of Interior. However, even these people don't always have the information because they have never been to some of the places about which they are queried. With a geographical index this information can be had with no waste of time. Such an index is not only a good handbook but is also a source of historical, archeological and statistical information. It is also a great time-saver in educational research. Therefore, progressive countries have geographical indices, some quite extensive and some abridged. Thailand however, still had no geographical index of the type mentioned. Therefore it was decided that a start should be made to arrange a geographical index for Thailand to include the names of provinces, districts, townships, mountains, rivers, streams, swamps, canals, marshes, islands, gulfs, peninsulas, etc.; it was also to give data on the terrain, history, places mentioned in ancient legends and statistics such as population, occupations, etc.

When this proposal was submitted to the Minister of Religion, he agreed with it and arranged for it to be carried out. The Commission for Improving the Dictionary therefore set down guidelines for information to be provided by religious heads in the provinces for their respective provinces. The district religious heads in turn collaborated with provincial heads in obtaining the information as described in the format established by the Commission for Improving the Dictionary. Once they had completed this information the district religious heads then forwarded it to the Ministry of Religion.

In 1935, the Ministry of Religion turned over the work

of improving the dictionary to the Royal Academy because it felt that the preparation of a geographical index was properly a part of the work of the Commission for Improving the Dictionary. The Ministry of Religion had only assisted in gathering the information from the various provinces and there was also a shortage of qualified personnel to carry out this large project. So the Royal Academy was asked to take over the work and they were more than glad to comply because it was felt the preparation of the geographical index was a kind of historical work related to geography, and by royal decree such work has been delegated to the Royal Academy. In carrying out this work the Royal Academy intended to compile a geographical index for only Thailand although the decree authorizes the Royal Academy to compile a similar index for foreign countries. The decree states that the duties of the Royal Academy are to "research and promote all studies that are beneficial to the nation and the people"; therefore the Academy is interested in creating as many textbooks and manuals as possible with the intellectual and financial assets available.

When the Royal Academy accepted the task of preparing a Thai geographical index from the Ministry of Religion, it began pressing the 25 provinces that had not yet done so, to submit the information that had been requested as quickly as possible and a commission, called the "Commission for Preparing the Geographical Index", was established. This commission was changed and enlarged as it became necessary and included the following persons:

1.	Prince Thongthikhayu Thongyai	Commission President
2.	Phya Nakhonphraran	Commission Member
3.	Phra Barihanthepthani	" "
4.	Phya Phananuchon	" "
5.	Phra Phinichawannakan	" "
6.	Phya Methathibadi	" "
7.	Phya Ratchasanao	" "
8.	Luang Wichittonwatthakan	" "
9.	Lt. Gen. Phya Sanwitthannithet	" "
10.	Phra Sanprasareut	" "
11.	Phya Anumanratchathon	" "
12.	Phya Anthakawisunthon	" "
13.	Representatives of the Army Map Department (Lt. Col. Phra Chenphumisat, Col. Luang Anumanmetthani)	" "
14.	Representatives of the Department of Hydrology (Adm. Luang Chontharphrutikrai and Capt. Luang Phichaiwari of the Royal Navy)	" "
15.	Representatives of the Thai Ministry of Interior (Mr. Thawi Raengkham, Mrs. Thawi Wongthawanyasak, Phra Anurakphubet, Mr. Phut	

Dechakhup, Khun Anubannikhomkhet, General Wongsaroot, Mr. Sanit Chutharop) Commission Member

16. Representatives of the Department of Railroads (Phra Phatrakitchakooson) " "

17. Representatives of the Ministry of Foreign Affairs (Prince Wongsanuwat Thewakun) " "

18. Mr. Charcun Inthonketsaton Secretary

This commission met for the first time on 22 May 1936 and began establishing rules and working procedures, and then started work first on the list of provinces for the geographical index. The commission had nearly completed this part of the index when, due to various difficulties, the work came to an abrupt stop.

In 1954 the Royal Academy felt that it should revive the work on the geographical index which had been stopped so long before. Therefore a proposal was submitted to the Minister of Culture who, in his position, controls the Royal Academy. The proposal was okayed and the Royal Academy then requested that the Council of Ministers permit a commission to be established composed of the following persons:

1. Maj. Gen. Phrachao Ruangthen and Krommun Narathipaphongpraphan Advisors

2. Phya Anumanratchathon Commission President

3. Mr. Kisom Bunsri Commission Member

4. Mr. Tri Amatayakun " "

5. Representatives of the Department of Irrigation (Luang Chonchalatpridarom, Mr. Phat Kaewsiplat) " "

6. Representatives of the Department of National Highways (Mr. Amphon Sunonan) " "

7. Representatives of the Army Map Department (Brig. Gen. Luang Anusonthisakhet, Maj. Gen. Khunsrisamitkan, Col. Phunphon Asonchinda) " "

8. Representatives of the Ministry of Interior (Mr. Chamnan Yuwabun, Mr. Praphat Bunchuai, Mr. Phaibun Wattanaphanit, Mr. Chamrun Piyamputra, Mr. Wichit Sukhawiriya, Mr. Pradit Chongsupphan) " "

9. Representatives of the Department of Hydrology (Capt. Sawan Thimudom, Commander Root Hongprasit) " "

10. Mr. Chareun Intharaketsaton Committee Member and Secretary

After the Council of Ministers had approved the establishment of the commission, the first meeting was held on 22 July 1954. The rules and procedures used by the previous commission were adopted and a geographical index for those provinces not yet completed was set up. The portion of the index that had been completed for some of the provinces was changed to include any changes that had taken place during the interval that work on the index had stopped, and the categories were arranged in alphabetical order.

This time is a happy occasion because the Commission for the Geographical Index has completed the index and is ready to send it to the printer. The Commission has agreed to publish the Thai Geographical Index in the following three volumes:

Volume 1 - Covers general topics including the following:

Chapter 1 - Geography

1. General Topography - Phya Anumanratchathon is the author.
2. Mountains
3. Rivers

Maj. Gen. Khunsrisamitkan, an advisor to the Army Map Department and a representative of the Army Map Department on the Commission for the Geographical Index, is the author of the parts on mountains and rivers.

Chapter 2 - Climate

Vice Adm. Charun Wichayaphai Bunnak, director-general of the Department of Meteorology, is the author.

Chapter 3 - Native Flora

Mr. Kasin Suwataphan, a professor of botany with the Department of Science at Chulalongkorn University, is the author.

Chapter 4 - Native Fauna

Professor Choti Suwatthi, dean of the Department of Fishing at Chulalongkorn University, is the author.

Chapter 5 - Natural Resources

1. Minerals - Mr. Thot Phanthumsen and Mr. Changek, of the Department of Mining, are the authors.
2. Forests - Mr. Khit Suwannasutthi, an expert with the Department of Agriculture, is the author.
3. Marine Life - Professor Chooti Suwatthi, dean of the Department of Fishing at the University of Agriculture, is the author.

Chapter 6 - Communications

Mr. Chamnan Inthusoophon, a former undersecretary of the Ministry of Communications, is the author.

Chapter 7 - Various Nationalities

Phya Anumanratchathon is the author.

Chapter 8 - Customs and Traditions

Mr. Chareun Intharaketsaton, head of the Office of Academic Subjects of the Royal Academy and a member and secretary of the Commission for the Alphabetical Index; and Mr.

Charun Khumwong, head of the Department of the Geographical Index, did the compiling and writing.

Volume 2 and Volume 3 - These volumes consist of topics relating to the alphabetical index arranged in alphabetical order.

Any geographical study, as any researcher well knows, must include maps. Therefore, in addition to the small maps scattered throughout the writings, large maps have been published in a special volume.

Due to the fact that the compiling of a geographical index is such a large work that requires the cooperation of many government agencies and individuals, the Commission for the Geographical Index and the Royal Academy could not have brought this work to such a successful conclusion without the physical and intellectual help of all who contributed to this project. The Royal Academy feels especially honored and wishes to extend its heartfelt thanks to each person, both those whose names have been mentioned and those whose names were not mentioned, for all they did to make this work a success.

There is one more thing that the Royal Academy must not omit in this introduction and that is a special thanks to the members of the Commission for the Geographical Index and the representatives of the various departments who accepted the assignment and carried out their duties with a very laudable sense of responsibility, to the man. Each of these men played an especially important role in compiling this geographical index.

Phya Anumanratchathon
Chairman of the Royal Academy
President of the Commission
for the Geographical Index

The Royal Academy
August 1963

EXPLANATION

The Basis for Compiling the Thai Geographical Index

1. Provinces - listed in the following manner:
   (1) Region in which province is located by topographical features, location in an easily understood manner and a map;
   (2) Boundaries with other provinces, starting from the north and moving east;
   (3) Routes used to get there from Bangkok; by railroad, highway, water, or air;
   (4) Distance from Bangkok (if outside Bangkok) given in official figures, such as references to railroad or highway kilometer posts;
   (5) Topographical features of the province;
   (6) Population according to the last census but given to the nearest thousand; if the figure is over 500 another thousand is added, if less than 500, it is dropped. For instance, the population of Phetchonburi Province is 225,761 persons but, for the purposes of this book, is given as 226,000 persons. This figure, in turn is shortened to 226 because population is given in thousands;
   (7) Occupations of the populace;
   (8) A short history and related legends or tales;
   (9) List of important places and things;
   (10) District divisions.

2. Districts - listed in the following manner:
   (1) In what province it is located;
   (2) Borders with other districts, starting from the north and moving east;
   (3) Routes to the district from the administrative seat of the provinces;
   (4) Topographical features;
   (5) Population (given in the same manner as the provinces);
   (6) Occupations;
   (7) Short history and related legends and tales;
   (8) Township divisions.

3. Townships - listed in the following manner:
   (1) In what district and province it is located;
   (2) Short history and related legends and tales (if any);
   (3) Important places or things in the township (only names are given).

4. Rivers, Mountains, Islands, etc.

(1) Rivers and other large waterways - Data given includes approximate length, source, direction of flow, provinces located in the river basin, tributaries and any pertinent historical references;

(2) Canals, streams, swamps, marshes, river mouths, gulfs and gaps (both water and land) - Location, size, usefulness and pertinent history are given;

(3) Mountains - Location, heights of highest peaks and important things on the mountains are given;

(4) Islands - Same sequence is used as for the provinces, districts and townships. Size is given last;

(5) Other important things such as temples, objects and historical places, nature, points of interest, etc. are related by location, features, size and history.

5. Customs - These are given by region because of the confusion that would result if customs were broken down by provinces.

6. District, provincial and even national territories are based on maps of the Army Map Department. If the information is not given on the map, data provided by the Ministry of Interior is used. Where possible, latitudes and longitudes are given, also.

7. Some places, even though they are not true geographical names, that is, they are not names of provinces, districts, townships, etc., but are widely used and are of importance from the standpoint of history, economics, or communications, are listed where it is felt necessary.

8. Geographical names that are identical:

(1) If it is a geographical name that can be used many ways, some of the following explanatory words are used: province, district, township, railroad station, route, waterway, canal, stream, marsh, pond, pool, gulf, mountain, hill, forest, island, peninsula, rocks, etc.

(2) If they are identical geographical names, such as townships with the same name, they are listed alphabetically by the province in which they are located.

9. The names of mountains that are preceded by such words as "phu, doi, khuan, pha" or "phanom" are listed without these words; but for the convenience of the researcher such names are listed in two places, one with the preceding word listed in parenthesis after the name and one with the preceding word in front of the name. An example is "Mt. Kradung" which can be found listed as "kradung (phu)" and as "phu kradung".

10. The word "han," which is the name of canals, streams, swamps and marshes, is written several different ways but in this book only one spelling is used because this word is believed to stem from the word "lahan" which is spelled in the Royal Academy's dictionary "lahan."

11. The names of provinces, districts and townships are spelled in accordance with the Royal Academy dictionary.

12. Units of measurement are, for the most part, given in the approximate metric unit. Heights of mountains, islands, etc. are given in distance above sea-level.

13. Longitudes are given in longitudes east of Greenwich.

14. Words for which there are many names - Usually the word accepted by the government is used but the other names are listed alphabetically with an explanation giving the word considered the most important.

15. The alphabetical listing used is the same as the dictionary published by the Royal Academy in 1950.

(1) Consonants are listed by spelling not by sound.

(2) Vowels are not listed by sound but are listed in the dictionary order.

(3) Where consonants and vowels are mixed they are listed in the sequence used in the dictionary noted above.

(4) Tones, vowel markers and silencers are not considered in listing the words alphabetically.

16. Words which are estimated to be used 500 times or more are abbreviated. Words that do not have more than two characters are not abbreviated.

The Commission has tried its utmost to see that the Thai Geographical Index has followed the criteria mentioned above. But there may be some deviations due to many factors. In some cases it simply is not known how to correctly list a given item, or in some cases where it is known, it is not used in the geographical index because it has not been definitely accepted yet, etc.

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CHAPTER 1

GEOGRAPHY

I. General Geographical Features

A. Location Thailand is in the center of Southeast Asia, or, as it is also called, the Indochinese Peninsula because this region is a peninsula between India and China. Thailand lies between 5° 37' and 20° 27' north latitude and between 97° 22' and 105° 37' east longitude.

It is 1,620 kilometers long at its longest points (north - from Maesai District of Chiangrai Province; south - to Betong District of Yala Province).

It is 750 kilometers wide at its widest points (west - from the border pass of Prachedi Samong, Thongphaphumi District, Kanchanaburi Province; east - to Chongmet, Phibunmangsaban District, Ubonratchathani Province).

It is 10.1 kilometers wide at its narrowest points (west - from 11° 42.4' north latitude; east - to Pakhuaiwathoon, Khlongwan Township, Muang District, Prachuabkhirikhan Province.)

B. Boundaries To the north Thailand borders Burma and Laos; to the east it borders Laos and Cambodia; to the south it borders the Gulf of Siam and Malaysia; to the west it borders Burma, the Sea of Andaman and the Strait of Malacca.

The borders of Thailand measure approximately 5,820 kilometers, of which 2,420 kilometers are seacoast (1,930 kilometers along the Gulf of Siam and 490 kilometers along the Sea of Andaman and the Strait of Malacca). This leaves 3,400 kilometers of land border.

C. Geography Includes: 1. lowlying plains area which floods during

the rainy season, has fertile soil carried down by the flooding waters, and many inter-connected waterways; 2. mountainous areas, most of which are covered by dense jungles which run down to the various plains and rivers forming valleys, some wide and some narrow depending on the terrain; 3. high plateaus which, for the most part, are sparsely wooded and rolling.

D. Regions Thailand can be divided into four main geographic regions, the northern, central, northeastern and southern.

1.The Northern Region This region is generally mountainous, jungle-covered terrain. There are some level areas in the various river basins, some wide and some narrow depending on the geographical features. Population is centered in the wide river basins because the people depend upon the water for their farming. Some parts of the rivers are used for transporting the farmers' goods and as communication routes, and it is along these parts that the people have settled. There is one large lagoon in this region, "kwanphayao" in the area of Phayao District, Chiangrai Province.

In Muang District of Chiangmai Province and Muang District of Chiangrai Province the height above sea-level is 307 and 394 meters respectively. At the northern tip of the Wang River in Muang District of Lambang Province the height is 235 meters and at Denchai on the Me Yom River it is 153 meters above sea-level.

On the north the northern region borders Burma (the Lao-Daen Mountain Range, the Sai River and the Ruak River form the boundary) and Laos (the Mekong River forms the boundary). On the east it borders Laos (the Luang Prabang Mountain forms the border). On the south it borders the central region (the Phlung Mountains and Bariwan Mountains comprise most of this area). On the west it borders Burma (the Mei River and a portion of the Khong or Salaween River form the border).

2. The Central Region Most of this area is a broad low-lying plain but there are some highlands near the mountains which slope down to the rivers. The central region can be divided into three river basins, the Chaophraya River basin, the Klong River basin, and the Chanthaburi River basin.

The Chaophraya River basin is a broad plain which can be divided into two parts, the northern part, with the basin formed by the Ping, Wong, Yom and Nan Rivers (the various provinces that have been established in the northern part of this region were known in ancient times as Muang Nua or North Country), and the southern part with the river basin formed by the Chaophraya River, Thachin River and the Bang Pakong River. Most of Chao-

phraya River basin is made up of large fields with many canals criss-crossing through them. In the rainy season the water overflows the banks and floods the fields bringing in fertile soil so that most of this basin is suitable for rice-growing. As it is the fertile area of Thailand, and the territory which is the mouth of all three rivers forms a triangle, this point is called the Chaophraya River triangle.

The Mae Klong River basin is in the territory from 13° 10' to 16° 26' north latitude (the area comprising the provinces of Tak, Kanchanaburi, Rachaburi, Samutsongkhram and Phetchaburi). The western part of this basin is high because of the Thanonthongchai Mountain range but the eastern part, being close to the sea, is low and level so that it is suitable for farming and gardening.

The Chanthaburi River basin, which is to the southeast of the Chaophraya River basin, slopes down from the Chanthaburi Mountains. It is characterized by clusters of small hills and sandy soil. More rain falls in this section than in the others so that it is suitable for fruit gardening.

There are two large swampy areas in the central region of Thailand. One is the Boraphet Swamp in Nakhon Sawan Province and the other is Sifai Swamp in Phichitan Province, and there are some large islands, such as Chang Island, Kut Island, Khran Island and Sichang Island.

The edge of the central region, along the Nan River, Muang District, Uttaradit Province is 63 meters above sea-level. At the mouth of the Pho River in Muang District of Nakhon Sawan Province it is 37 meters above sea-level. In Pranakhon Sriayutthaya District of the Pranakhon Sriayutthaya Province it is not over five meters above sea-level, and in Bangkok it is not over 1.80 meters above sea-level.

The central region is bordered on the north by the northern region; on the east by Laos (Chaiburi District, Lanchang Province), the northeastern region, and Cambodia. To the south the central region borders on the Gulf of Siam and the southern region (between Prachuabkhirikhan Province and Chumphan Province). On the west it is bordered by Burma (the border is formed by the Thanonthongchai Mountains, the Mai River, and the Tanawsri Mountains).

3. The Northeastern Region This region is a high plateau with rolling hills that slope to the southeast toward Mun River basin. The rainy season makes communications difficult. The flood waters run off quickly so that there is a shortage of water during the other seasons. The populace depend for their water upon a few large lakes which have water year-round. Two of these large lakes are Lake Han in Sakon Nakhon Province and Lake Han Kumphawapi in Udonthani Province.

The western and eastern parts of this region vary consider-

ably in average height above sea-level, from 123 to 185 meters. The elevation at Muang District of Ubonratchathani is 123 meters, 185 meters at Muang District of Nakhonratchasima, 174 meters at Muang District of Udonthani, 168 meters at Muang District of Nong Khai Province, 159 meters at Muang District of Sakon Nakhon Province, and 144 meters at Muang District of Nakhon Phanom Province.

The northeastern region borders Laos on the north and northeast (the Mekong River forms the largest part of this border). To the south it borders the central region and Cambodia (the Phanom Dongrak and Sankham Phaeng Mountains form this border). On the west this region borders the central region (the Phetchabun Mountains, for the most part, and the Dong Phayayen Mountains form this border).

4. The Southern Region This region is level, close to the sea, and dry. At some points it is wide and at some points it is narrow depending on the terrain. In addition, there are some mountains and points of high elevation.

The southern region is the northern part of the Malaysian Peninsula. From north to south it is 750 kilometers (from 11° 42.4' to 5° 37' north latitude) and from west to east at the narrowest point it is 10.6 kilometers wide (west - from 11° 42.4' north latitude, east - to the mouth of the stream Wathoon, Khlongwan Township, Muang District, Prachuabkhirikhan Province), while at its widest point it is 195 kilometers to 200 kilometers (a line from 6° 45' north latitude running from Ban Sakhon, Sakhon Township, Muang District, Satun Province on the west to Ban Tawe, Paseyawa Township, Sayaburi District, Pattani Province on the east). Songkhea Lake is in this region as are the large islands of Samuy and Phangan in the Gulf of Siam, Phuket in the Sea of Andaman, and Tarutao and Lanta in the Strait of Malacca.

The southern region borders the central region on the north, the Gulf of Siam on the east, Malaysia on the south (the Sankalakhiri Mountains and the Koo Log River form the boundary), and on the west it borders the Sea of Andaman, the Strait of Malacca and Burma (the Tanawsri Mountains and Kraburi River form the border).

II. Mountains

The important mountain ranges in Thailand include: 1. Chanthaburi; 2. Dongphayayen; 3. Daenlaw; 4. Tanawsri; 5. Thanonthongchai; 6. Nakhon Srithammorat; 7. Banthat; 8. Phipannam; 9. Phanomdongrak; 10. Phechanbun (Phechanbun 1 and Phechanbun 2); 11. Phuket; 12. Sankalakhiri; 13. Sankamphaeng; 14. Luang Phrabang.

1. Chanthaburi - This mountain range begins with foothills in the large gap in the Banthat Range and goes west for 281 kilometers. From the north of these mountains water flows down to the Prachinburi River and the Bang Padong River. From the southern side of these mountains water flows down to the Gulf of Siam.

The Chanthaburi Range (from east to west) includes the following mountains: 1. Three Gaps Mt. (Samngam - 724 meters); 2. Salt Mt. (Klua - 647 meters); 3. South Star-picker Mt. (Soidawtai - 1,639 meters); 4. North Star-picker Mt. (Soidawnua - 1,680 meters); 5. Pass Mt. (Chong Khaeb - 400 meters); 6. Big Pebble Heap Mt. (Kruatkong Yai - 676 meters); 7. Fifteen-Story Mt. (Sipha Chan - 800 meters); 8. Sapphlukaithuan Mt. (287 meters); 9. Big Mt. (Playlam krayang - 776 meters); 10. Angkraden Mt. (375 meters); 11. Shipwreck Mt. (Ruataek - 391 meters); 12. Pink Mt. (Chomphu - 732 meters); 13. Green Mt. (Khiaw - 797 meters); and Roseapple Mt. (Bochomphu - 611 meters), which is the last mountain of the range.

This range passes through the following administrative areas: 1. It is a dividing boundary between Poongnamron District and Khalung and Makhan Districts of Chanthaburi Province for 60 kilometers. 2. It passes through Taphienthong Township, Makham District, Chanthaburi Province for 21 kilometers. 3. It separates Thamai District, Chanthaburi Province from Phanomsankham District, Chacheungsao Province for 65 kilometers. 4. It separates Phanomsankham District, Chacheungsao Province from Phanatnikhom District, Chonburi Province for 25 kilometers. 5. It passes through the townships of Bothong, Thabunmi and Monnany, Phanatnikhom District, Chonburi Province for 28 kilometers. 6. It passes through the townships of Khlongphlu and Nongirun, Bangbung District, Chonburi Province for 28 kilometers. 7. It separates Bankhai District from Sriracha and Muang Districts, Chonburi Province for 54 kilometers.

2. Dongphayayen - This mountain range begins at the Sunnaray Highway and continues south from the Phechonbun #1 past the northeastern railway between the Pangosook Station and Bandayma Station. Then it crosses Mitraphap Highway at about kilometer post number 170. The range then continues on south all the way to Inthani Mt. and Glass (Kaew) Mt. which terminate this range after about 144 kilometers. From the eastern half of this mountain range water flows down via various streams to the Mun and Lamtakhong Rivers. From the western side water flows down to Pasak River and some small streams (as for the section from Inthani Mt. to Kaew Mt., water from the southeastern half flows down to the Nakhon Nayok River).

Names (some are unnamed) of mountains in this range include: 1. Mountain (600 meters); 2. Mountain (600 meters);

3. Mountain (587 meters); 4. Takhianngam Mt. (644 meters); 5. Mountain (548 meters); 6. Mountain (630 meters); 7. Mountain (594 meters); 8. Mountain (555 meters); 9. Bad Spirit Mt. (Saenha - 615 meters); 10. Mountain (560 meters); 11. Mountain (694 meters); 12. Mountain (804 meters); 13. Sandalwood Mt. (Maichant - 703 meters); 14. Mountain (1,086 meters); 15. Mountain (1,017 meters); 16. Mountain (1,023 meters); 17. Glass Mt. (Keew - 1,013 meters); and Inthani Mt. (1,068 meters) which is the last mountain of the chain.

This mountain range passes through the following administrative areas: 1. It passes through Nayangklak, Bansuan, and Banphechan Townships of Bamhenchanarong District, Chaiphumi Province for 10 kilometers. 2. It passes through Phanchana Township and Bankao Township of Dankhunthot District, Nakhonratchasima Province for 22 kilometers. 3. It passes through Nongyaito, Chaibadan and Makokwan Townships of Chaibadan District, Lopburi Province for 42 kilometers. 4. It passes through Pakchong and Klongdong Townships of Pakchong District, Nakhonratchasima Province for 50 kilometers. 5. It serves as a boundary for three provinces: in Pakchong District, Nakhonratchasima Province; Kaengkhoi District, Saraburi Province; and Muang District, Nakhon Nayok for 20 kilometers.

An old name for this mountain range was likely "Dongphayafai" like the name of the jungle. At the time of the reign of Rama IV at Bangkok the Phayafai Jungle was given the new name "Dongphayayen". It is therefore likely that the present name of this mountain range has evolved similarly.

3. Daenlaw - The book "Siam, Nature and Industry", issued by the Ministry of Commerce and Communications, Bangkok, 1930 states that "The Mekong River and the Khong (Salaween), at the time they start south in China, split and the Mekong goes southeast because of a large mountain range. This is the Daenlaw Mountain Range that plunges south into Burma. When this range reaches Thailand it goes westerly to meet the Thanonthongchai Range."

While stating this, it must be kept in mind that the section of the Mekong that splits from the Khong River (both these rivers join and separate at various times as can be seen on the map) marks the beginning of the Daenlaw Mountains. This is at about 25° 10' north latitude, 99° 10' east longitude at the towns of Pao-Shan (Yung Ch'ang) and Ch'ang-Ning (Yu-Tien) in China. This mountain range separates the water in two directions; on the eastern side the water becomes the Mekong River and on the western side it becomes the Khong River. This long mountain range goes south in China for about 610 kilometers.

When it approaches close to Burmese territory this mountain range turns slightly southwest to enter and cross Burmese terri-

tory. Then it resumes its southerly direction all the way to Mt. Phahompok #1. The total length of this range within Burmese borders is about 600 kilometers.

Mt. Phahomok (Blanket Mt.) #1 separates the water at that point. The water flowing to the northwest becomes the Khong River; to southwest it becomes the Ping River; while the water flowing to the northeast, east, and southeast flows into the Kok River and then into the Mekong River.

From Mt. Phahompok #1, the long range goes westerly and becomes the border separating Thailand and Burma as far as a mountain (name not known) at about 19° 41' north latitude, 98° 33' east longitude (this mountain lies eight kilometers west of Muang Haeng Pass). At this point a mountain range from the south joins this range. The range from the south is the Thanonthongchai Range and it joins with the Daenlaw Range to delineate the Thai border for a distance of about 120 kilometers.

At the point where the Daenlaw Range and the Thanonthongchai Range meet, the way the water drops is the deciding factor as to which range goes which direction. According to the maps the water flowing to the northeast, north, northwest, west and southwest all flows down into the Khong River, whereas the water flowing to the south flows to the Haeng and Taeng Rivers and then to the Ping River.

The Daenlaw Range is about 1,220 kilometers long from China to Burma and then along the Thai border. The section of the range which serves as the Thai-Burmese border is 120 kilometers long.

This range includes the following mountains and passes: 1. Mt. Phahompok #1 (2,146 meters); 2. Mt. Un (1,850 meters); 3. Laktaeng Pass; 4. Kiwphawok Pass; 5. Bowl Mt. (Thuai - 1,823 meters); 6. Mt. Ko (1,648 meters); 7. Elephant-Grass Mt. (Pukpafaek - 1,601 meters); 8. Muang Haeng Pass; 9. at the end the range follows the Thai border another eight kilometers and then joins the Thanonthongchai Range.

This mountain range passes through the following administrative areas in Chiang Mai Province: 1. It passes through the townships of Maeai, Maesao, Maengon, and Pongtam in Fang District for 64 kilometers. 2. It passes through Muang Na and Muang Haeng Townships in Chiang Dao District for 56 kilometers.

4. Tanawsri - This mountain range begins with a large mountain in the Thanonthongchai Range. It goes northwest to the Thai-Burmese border and then it goes west and south where it, too, runs along the Thai-Burmese border to about 10° 49' north latitude, 98° 57' east longitude. This range serves as the border between Chumphan Province and Ranong Province up to the Phechankesom Highway. The Chumphan-Pakchan section is 834 kilometers long. From the northern and western sides of these

mountains water flows into Burma and to the Kraburi River. From the southern and eastern sides of this range water flows to the Khaew River, Phachi River, Pranburi River, and other rivers, and finally into the Gulf of Siam.

This mountain range includes the following mountains: 1. Mountain (859 meters); 2. Mountain (1,329 meters); 3. Boundary marker; 4. Luphowi Mt. (929 meters); 5. Mountain (742 meters); 6. Mountain (806 meters); 7. Kyuyae Mt. (852 meters); 8. Mountain (619 meters); 9. Mountain (390 meters); 10. Khrondoo Mt. (635 meters); 11. Mountain (618 meters); 12. Phrachedi Samong (247 meters) at which point there is a railroad which the Japanese built during World War II from Thailand to Burma; 13. Mountain (634 meters); 14. Mountain (823 meters); 15. Mountain (733 meters); 16. Mountain (879 meters); 17. Mountain (835 meters); 18. Mountain (1,192 meters); 19. Mountain (1,040 meters); 20. Mountain (870 meters); 21. Mountain (871 meters); 22. Mountain (1,007 meters); 23. Mountain (905 meters); 24. Mountain (1,089 meters); 25. Mountain (881 meters); 26. Mountain (1,015 meters); 27. Mountain (884 meters); 28. Mountain (863 meters); 29. Mt. Mayantong (1,163 meters); 30. Mt. Mangacho (1,210 meters); 31. Mountain (1,009 meters); 32. Hinkong Pass Mt. (1,081 meters); 33. Daen Mt. (1,224 meters; 34. Mountain (1,319 meters); 35. Mt. Songkhaewa (1,325 meters); 36. Mt. Tentong (1,018 meters); 37. Daen Mt. (1,108 meters); 38. Mountain (884 meters); 39. Mt. Rawrae (1,132 meters); 40. Mountain (832 meters); 41. Mountain (1,085 meters), 42. Mt. Nokhlo (979 meters); 43. Mountain (667 meters); 44. Mountain (958 meters); 45. Mt. Wayo (876 meters); 46. Mountain (764 meters); 47. Ban Bongtibon; 48. Mountain (710 meters); 49. Mountain (702 meters); 50. Daen Mt. (669 meters); 51. White-Water Stream Mt. (Huainamkhao - 757 meters); 52. Nekhiathung Mt. (910 meters); 53. Mountain (994 meters); 54. Mountain (963 meters); 55. Wainoi Mt. (1,163 meters); 56. Mountain (1,149 meters); 57. Mountain (1,164 meters); 58. Mountain (1,118 meters); 59. Mountain (828 meters); 60. Mountain (847 meters); 61. Mountain (993 meters); 62. Mountain (906 meters); 63. Mountain (801 meters); 64. Mt. Wanmi (1,141 meters); 65. Mountain (921 meters); 66. Mountain (960 meters); 67. Mountain (1,505 meters); 68. Mt. Ngayannikayawoktong (1,412 meters); 69. Mt. Palatong (1,452 meters); 70. Mountain (1,259 meters); 71. Mt. Yakaetong (1,000 meters); 72. Mountain (1,098 meters); 73. Mt. Yekayetong (1,335 meters); 74. Mountain (1,138 meters); 75. Mountain (1,325 meters); 76. Mountain (1,082 meters); 77. Mountain (1,138 meters); 78. Mountain (1,303 meters); 79. Mountain (1,191 meters); 80. Mountain (1,230 meters); 81. Big Mt. (1,335 meters); 82. Mountain (938 meters); 83. Mountain (751 meters); 84. Mt. Daen (652 meters); 85. Mountain (728 meters); 86.

Mountain (796 meters); 87. Mountain (626 meters); 88. Mountain (887 meters); 89. Mt. Kayokphayatong (897 meters); 90. Mt. Daenphraekakhawa (911 meters); 91. Mt. Daen (911 meters); 92. Mountain (945 meters); 93. Mountain (960 meters); 94. Mountain (873 meters); 95. Mountain (916 meters); 96. Mountain (719 meters); 97. Mountain (778 meters); 98. Mountain (709 meters); 99. Poongphai Pass; 100. Mountain (598 meters); 101. Mountain (597 meters); 102. Mountain (520 meters); 103. Mountain (625 meters); 104. Mountain (518 meters); 105. Sanphrao Pass (Singkhan); 106. Mountain (483 meters); 107. Mountain (423 meters); 108. Mountain (494 meters); 109. Mountain (462 meters); 110. Mountain (640 meters); 111. Royal Mt. (Luang - 1,245 meters); 112. Mountain (1,174 meters); 113. Mountain (1,000 meters); 114. Mountain (900 meters); 115. Mountain (631 meters); 116. Mountain (624 meters); 117. Mountain (467 meters); 118. Big Mt. (Yai - 884 meters); 119. Mountain (808 meters); 120. Mountain (805 meters); 121. Mountain (862 meters); 122. Nonghoi Pass; 123. Mountain (585 meters); 124. Hindat Pass; 125. Mountain (876 meters); 126. Mt. Ngawunchongtong (757 meters); 127. Mountain (804 meters); 128. Mountain (785 meters); 129. Pass (name not given); 130. Mt. Din (835 meters); 131. Big Tai Mt. Pass; 132. Mountain (598 meters); 133. Mountain (567 meters); 134. Border Mt. (Daen - 591 and 517 meters); 135. Big Border Mt. (Daenyai - 575 meters); 136. Khonwangnoi Mt. (666 meters); 137. Border Mt. (Daen -708 meters); 138. Pig's-Leg Mt. (Khamu - 784 meters); 139. Border Mt. (439 meters); 140. Chamya Mt. (543 meters); 141. Red Mt. (Daeng - 534 meters); 142. 10° 49' north latitude 98° 57' east longitude which is on the international boundary. There are also the mountains which serve as the borders between Chumphan Province and Ranong Province; these include: 143. Mt. Plaikhlongsatung (501 meters); 144. Mt. Plaikhlongsaion (684 meters); 145. Border Mt. (Daen - 448 meters); 146. to approximately kilometer marker #34,267 at the Phechankesom Highway (the Chumphan - Pakchan section). From here the range continues to Mt. Hinlu and south. As it goes further south this range is called the Phuket Range.

This mountain range passes through or serves as the boundary for the following provinces: 1. It passes through the townships of Laywoo, Nonglu in Sangkhala Sub-District, Thongphaphumi District, Kanchanaburi Province; the townships of Pilok, Thakhanun, Hindad, and Linthin of Thongphaphumi District, the townships of Saiyook, Lumsum, and Sing of Saiyok Sub-District, Muang Kanchonburi District; and Chrakhephuak Township of Muang District, in Kanchanaburi Province, for 320 kilometers. 2. It passes through the townships of Danthaptakoo and Suanphung in Chombung District, Rachaburi Province for 64 kilometers. 3. It passes through Yanguamklatnua Township, of Khaoyoi District,

Songphinong Township and Klatluang Township of Thangyang District, Phechanburi Province for 108 kilometers. 4. It passes through Hinlekfai Township of Huahin District, Khaonoi and Silaloi Townships of Pranburi District, the township of Samkrathai, Kuyaburi of Kuyaburi Sub-District; the townships of Bonok, Aonoi, Kawlak and Khlongwan in Muang Prachuapkhirikhan District; the townships of Huiyang, Thapsakae, and Angthong of Thapsakae District; the townships of Thongchai, Ronthong, Phongprasat, Bangsaphan, Pakphraek, and Saithong in Bangsaphan District of Prachuapkhirikhan Province for 246 kilometers. 5. It passes through the townships of Salui and Rapro in Thasae District, Chumphan Province for 46 kilometers. 6. It is a provincial boundary between Kraburi District, Ranong Province and Thasae and Muang Districts, Chumphan Province for 50 kilometers.

5. Thanonthongchai - This mountain range, according to the book "Siam, Nature and Industry", issued by the Ministry of Commerce and Communications, Bangkok, 1930, lies to the east of the Khaewnoi River in Kanchanaburi Province. It originates to the north. This mountain range joins with the range west of the Kaewnoi River, the Phrachedisamong Range. From there it goes north where it is the boundary between Thailand and Burma; then it goes west of the Ping River as far as the Daenlaw Range, which is also the boundary between Thailand and Burma in the northern part of Thailand. The Tanawsri Range joins the Thanonthongchai Range and they go south to the Phechankesom Highway. The section between Chumphan and Pakchan is the border between Thailand and Burma.

In deliberating where this mountain range originated and how far it went in which direction, the Royal Commission for Geographical Research relied upon the "Map of Tenaserim and the adjacent provinces of the Kingdom of Siam" at the Army Map Department with the border treaty of 1868 which First Lieutenant Arthur Herbertbake surveyed. Also used was the 1: 200,000 scale map of the Army Map Department. It was agreed, in this regard, to retain this mountain range as being to the east of the Khaewnoi River because it is from the western side of this range that water flows down to the river. Water from the eastern side of the mountain range flows down to the Maeklong River (Khaew Yai). At Big Mt. (Yai) the range goes north and water from the western side of the range flows down to the Big Maekasatri Stream and the Little Maekasatri Stream and then into Burmese territory. Water from the eastern side flows down to the Maeklong River (Khaew Yai). At Mukatu Mt. the range is the boundary between Thailand and Burma up as far as an unnamed mountain (1,722 meters). In this section of the range water from the western side of the range flows into Burmese territory and water from the eastern

side flows down to the Maeklong River, as before. From the previously mentioned mountain (1,722 meters) the range is in Thailand as far as the point where the water coming from the peaks separates and flows to the Maeklong River and the Umpiam Stream (the source of Maelamao Stream). From here the range winds in a northerly direction and because of this, water from the western side of the range flows down to the Khong River (Salween River) and water from the eastern side flows down to the Ping River until it reaches the Daenlaw Range which is the boundary between Maehongson Province and Chiang Mai Province (eight kilometers west of Muang Haeng Pass or 19° 41' north latitude, 98° 33' east longitude).

This mountain range is 880 kilometers long and includes the following mountains (from south to north): 1. Buffalo Pass Mt. (Chongkhwai - 239 meters); 2. Mountain (394 meters); 3. Mountain (259 meters); 4. Mt. Thammen (446 meters); 5. Glass Mt. (Kaew - 396 meters); 6. Little Glass Mt. (Kaewnoi - 365 meters); 7. Phitsadong (486 meters); 8. Muangkhrut Mt. (314 meters); 9. Srasiliam Mt. (225 meters); 10. Mountain (405 meters); 11. Mountain (614 meters); 12. Thing Pass Mt. (727 meters); 13. Banklang Mt. (825 meters); 14. Elephant-face Mt. (Nachang - 724 meters); 15. Mountain (644 meters); 16. Mountain (849 meters); 17. Mountain (906 meters); 18. Mountain (881 meters); 19. Mountain (870 meters); 20. Mountain (862 meters); 21. Mountain (820 meters); 22. Plaihuai-maekhaolam Mt. (780 meters); 23. Kholochaiye (1,031 meters); 24. Banchongwa; 25. Mt. Raisak (1,007 meters); 26. Mineral Mine Mt. (Borae - 897 meters); 27. Spirit Mt. (Tukaloo or Phi - 896 meters); 28. Tukaloopookana (1,010 meters); 29. Mountain (1,109 meters); 30. Kungkuikhi Mt. (1,569 meters); 31. Ngiyai Mt. (1,686 meters); 32. Mountain (1,362 meters); 33. Kheloiku Mt. (1,744 meters); 34. Mountain (1,741 meters); 35. Big Mt. (Yai - 1,805 meters); at this mountain a small range goes off in a northwest direction and this is the beginning of the Tanaw-sri Range. 36. Mountain (1,024 meters); 37. Mt. Phraryysi (1,009 meters); 38. Mountain (1,011 meters); 39. Mountain (1,024 meters); 40. Mountain (1,089 meters); 41. Mountain (1,118 meters); 42. Chaluwamay Mt. (1,137 meters); 43. Thich-adu Mt. (1,014 meters); 44. Mountain (932 meters); 45. Tawe Mt. (1,059 meters); 46. Mountain (1,120 meters); 47. Mountain (943 meters); 48. Mountain (721 meters); 49. Mukatu Mt. (1,659 meters - the original surveyor had written the name of this mountain Moo Ga-Dok); 50. Mountain (1,806 meters); 51. Mount-ain (1,523 meters); 52. Mountain (943 meters); 53. Mountain (856 meters); 54. Mountain (1,158 meters); 55. Mountain (832 meters); 56. Mountain (1,219 meters); 57. Mountain (921 meters); 58. Khokphoochoo Mt. (638 meters); 59. Mountain (635 meters); 60. Khonalinsatharipik Mt. (1,743 meters); 61. Mountain (1,722 meters); 62. Mountain (1,787 meters); 63.

Khunapun Mt. (1,176 meters); 64. Salakphra Mt. (1,023 meters); 65. Phuluang Mt. (1,070 meters); 66. Namdip Mt. (893 meters); 67. Mountain (1,796 meters); 68. Pangkia Pass (1,204 meters); 69. Pata Mt. (1,500 meters); and finally to 70. Daenlaw Range, which is the border between Thailand and Burma, at 19° 41' north latitude, 98° 34' east longitude (eight kilometers west of Muang Haeng Pass), the terminal point of the Thanonthongchai Range.

The Thanonthongchai Range passes through the following administrative areas: 1. It passes through the townships of Makham, Kaengsian, Kawsamroong, Charakhaphuak, and Nongbua of Muangkanchonburi District; Sing Township and the sub-district of Saiyok District. In Muangkanchonburi District it is the boundary between the sub-district of Saiyok District and Muangkanchonburi District. It is the boundary between the sub-district of Saiyok and the Srisawat Sub-District; the Danmaechaelop Township, Srisawat Sub-District, Muangkanchonburi District; Chalae Township, Thongphaphumi District; Plangphen and Laywoo Townships, Sangkhalo Sub-District, Thongphaphumi District, Kanchonburi Province. The distance covered between these points is about 237 kilometers. 2. It is the provincial boundary between Sangkhala Sub-District, Thongphaphumi District, Kanchanaburi Province and Umphang District, Tak Province for 21 kilometers. 3. It passes through Maechan Township, Umphang District, Tak Province for 30 kilometers. 4. It is the boundary between Thailand and Burma in the townships of Maechan, Nongluang and Mookroo of Umphang District, Tak Province for 108 kilometers. 5. It passes through Mookroo Township, Umphang District, Tak Province for 10 kilometers. 6. It serves as provincial boundary between Maesot District, Tak Province and Muang District, Kampheengphechan Province for eight kilometers. 7. It is the territorial boundary between Bantak District and Muang District of Tak Province for 70 kilometers. 8. It is the territorial boundary between Maeramat District and Samngao District and Muang District of Tak Province for 46 kilometers. 9. It is the provincial territorial boundary between Maeramat District and Songyang District of Tak Province, and Omkoi District, Chiang Mai Province for 54 kilometers. 10. It passes through Omkoi Township, Omkoi District; Boluang Township, Hot District; Thapha Township and Banthap Township, Chomthong District, Chiang Mai Province for 72 kilometers. 11. It is the provincial territorial boundary between Maesariang District, Khunyuam District, Muang-Maehongson District, and Pai District of Maehongson Province and Maechaem District, Sameung District, Maetaeng District, and Chiang Dao District of Chiang Mai Province for 224 kilometers.

6. Nakhonsrithammarat - This range splits off from the Sankalakhiri Mountain Range at Mt. China and goes north to

Nakhonsrithammarat Province and Suratsthani Province for a distance of about 319 kilometers. Water from the eastern side of this range flows down to the Gulf of Siam and water from the western side splits into two parts. Water from the part from Mt. China to the railroad track at kilometer marker #751 flows down to the sea at Malaka Pass, and the water from the section of the range from kilometer marker #751 south to the end of the range flows down to the Gulf of Siam.

This mountain range includes the following mountains: 1. Mt. Luangfaimai (926 meters); 2. Mt. Khlongloon (746 meters); 3. Mt. Khlongsangwian (719 meters); 4. Mt. Songpratu (400 meters); 5. Mt. Luang (400 meters); 6. Mt. Latkwang (400 meters); 7. Mt. Ron (300 meters); 8. Mt. Nampliw (500 meters); 9. Mt. Phipan (300 meters); 10. Mt. (doi) Yangtaek (400 meters); 11. Mt. (doi) Hinkling (400 meters); 12. Mt. (doi) Hinkaew (400 meters); 13. Mt. Thamnon (500 meters); 14. Mt. Thamkhisua (400 meters); 15. Mt. Khuha (972 meters). From Mt. Khuha the range goes north about 12 kilometers where there are low foothills going to the west where they join with the foothills of the Phuket Range at the southern branch of the railroad at the kilometer marker that indicates 751 kilometers from Bangkok. 16. Mt. Luang (1,784 meters); 17. Mt. Maipaeng (700 meters); to South Wind Pass Mt. (Chonglomtai - 700 meters), which is the end of the mountain range.

This mountain range passes through the following administrative areas: 1. It is the provincial territory boundary between Sadao District, Hatyai District, and Rataphumi District of Songkhla Province and Muang District of Satun Province for 50 kilometers. 2. It is the provincial territory boundary between Palian District, Yantakhaw District, Muangtrang District and Huaiyot District of Trang Province and Khaochaison District, Muangphatlung District and Khuankhanun District of Phatthalung Province for 103 kilometers. 3. It is the district territorial boundary between Thungsong District and Chawang District, and Chauat District, Muang Nakhonsrithammarat District, and Thasala District of Nakhonsrithammarat Province for 98 kilometers. 4. It is the provincial territorial boundary between Thasala District and Sichon District, Nakhonsrithammarat Province and Ban Nasan District and Kanchanadit District, Suratthani Province for 68 kilometers.

7. Banthat - This mountain range is the boundary between Thailand and Cambodia for about 144 kilometers. Water from the eastern side of this range flows down to Kawpo Canal in Cambodia. Water from the western side flows down to the Gulf of Siam.

This mountain range begins on Sanphatphit Peninsula at

Khlongyai Township, Khlongyai District, Trat Province and goes north. It includes the following mountains. 1. Mt. Kutirysi (245 meters); 2. Mt. Khlongmanaw (261 meters); 3. Mt. Banthat (630 meters); 4. Mt. Banthat (568 meters); 5. Mt. Banthat (656 meters); 6. Mountain (1,293 meters); 7. Mt. Plaikhlongpunhaeng (287 meters); 8. Mt. Plaikhlongsiraman (456 meters); 9. Mt. Thapbandai (713 meters); 10. Mt. Tabat (704 meters); 11. Mt. Samngam (620 meters); 12. Mt. Tabaeng-yai (914 meters), which is the end of the range. To the west of this range is a range which goes to Chonburi Province which is called the Chanthaburi Range.

This range passes through the following administrative areas in Trat Province: 1. It passes through Khlongyai Township, Khlongyai District for 40 kilometers. 2. It passes through Laemklat Township, Chamrak Township, Takang Township and Thakum Township of Muangtrat District for 54 kilometers. 3. It passes through Danchumphon Township, Bophloi Township and Changthun Township of Khaosaming District for 50 kilometers.

8. Phipannam - The reason this mountain is called "spirit that divides the water" is believed to be because on the northern side of this range the water flows down various rivers and then into the Mekong River. From the southern side the water flows down various rivers and then into the Chaophraya River.

The Phipannam Range begins with the Daenlaw Range where it is the border between Thailand and Burma. It begins east of Kiwphawok Pass two kilometers (right at the border between Fang District and Chiangdao District of Chiang Mai Province). It is a long range that goes southeast across the Chiang Mai - Fang highway. The highest point along this highway is called "Big-headed Spirit" (panghuothoo). From this point the range continues on in the same direction to 19° 31' north latitude, 99° 18' east longitude for a total distance of 52 kilometers.

At 19° 31' north latitude, 99° 18' east longitude a different range splits from this range and goes in a northeasterly direction to Elephant Hill Mt. (Chang), and then north past Hang-son Mt. (doi) to Phalumhiang Mt. (doi) (three kilometers north of the seat of Muang Chiangrai District), which is the end of the range. Its total length is about 106 kilometers. Water from the western and northern slopes of this range flows down to the Fang River and Kok River. Water from the eastern and southern slopes flows down to the Lao River.

From 19° 31' north latitude, 99° 18' east longitude the Phipannam Range changes and goes south past Mt. (doi) Phipannam or Mt. (doi) Nangkaew, as it is also called, to Mt. (doi) Phacho, a total distance of about 68 kilometers.

At Mt. Phacho there is a different mountain range which

goes to the south across many high mountains to Mt. (doi) Khuntan. Later this range turns and goes northwest across Khuntan Tunnel and then south past Mt. (doi) Dindaeng and Mt. (doi) Fhanma (Horsetooth) to the east of Samngao District, Tak Province where the range ends. The total length of this range is 230 kilometers. Water from the eastern slope of this range flows down to the Wang River and water from the western slope flows down to the Ping River.

From Mt. Phacho the Phipannam Range turns back toward the northeast and the north again to 19° 31' north latitude, 99° 34' east longitude for a total of 74 kilometers.

At 19° 31' north latitude, 99° 34' east longitude a different range separates from the Phipannam Range and goes northeast across the Phahonyoothin highway (right at kilometer marker #205 on the Lampang-Chiangrai highway). Then it resumes its former direction as far as the edge of the right bank of the Mekong River (in the territory of Chiangsaen District and Chiangkhong District, Chiangrai Province). The total length of this range is 158 kilometers. Water from the western and northern slopes of this range flows down the Lao River and the Kok River. Water from the southern and eastern slopes flows down the Ing River.

From 19° 31' north latitude, 99° 34' east longitude the Phipannam Range turns back to the southeast again to Manhok Gap (khot) for a total distance of 60 kilometers.

At Manhok Gap a different mountain range separates from the Phipannam Range and goes south past Mt. (doi) Khunmaelak, and then turns east and crosses the Phahonyoothin highway (at kilometer marker #51 on the Lampang-Chiangrai highway; this point is called "Shrine of the Prince of the Stone Gate"; it is 572.8 meters above sea-level.) Then the range turns to the south and southwest past Mt. (doi) Phanamton. When it reaches Mt. (doi) Monthui it turns south to the Sukoothai - Tak highway at approximately kilometer marker #91. The total length of this range is 330 kilometers. Water from the eastern slope of this range flows down to the Yom River, and from the western slope to the Wang River.

From Manhok Gap the Phipannam Range goes southeast across the Phahonyoothin highway (at kilometer marker #117 on the Lampang-Chiangrai highway which is 505.8 meters above sea-level, or right at the provincial boundary between Ngao District, Lampang Province and Phayao District, Chiangrai Province). Then it resumes its former direction to 18° 50' north latitude, 100° 10' east longitude where it turns up north and east to Mt. (doi) Khunyuam #2. The total distance of this stretch of the range is 140 kilometers.

At Mt. Khunyuam #2 a different range splits from the Phipannam Range towards the south and southeast to the Phree-Nan highway (right at the provincial border between Rongkwang

District, Phrae Province and Sa District, Nan Province). Then it turns to the southwest past Mt. (doi) Pechang (Phasang) and Mt. (doi) Phayapo, then it turns to the west past Mt. Phalung. It crosses the northern branch of the railroad at Khao Phalung Station (251 meters above sea-level), then resumes its former direction again for 15 kilometers. As it continues it turns to the south to 17° 32' north latitude 99° 51' east longitude (10 kilometers to the east of Srisatnalai District, Sukhoothai). The total length of this range is 315 kilometers. Water from the eastern slope of this range flows down to the Nan River and from the western slope to the Yom River.

From Mt. Khunyuam #2 the Phipannam Range turns to the north to the Luang Phraband Range. This section of the range, about 18 kilometers long, ends about eight miles east of Mt. (doi) Khunyuam #1.

In all, the Phipannam Range is 412 kilometers. Water from its northern slopes flows down to the Fang River, Lao Kwanphrayao River, Ing River and down to the Mekong River. From the southern slopes water flows down to the Ping River, Wang River, Ngao River, Yom River and Nan River and hence to the Chaophraya River.

This mountain range includes the following mountains: 1. Panghuathoo is at kilometer marker #103.9 on the Chiang Mai - Fang River. It is 561.34 meters above sea-level. 2. Mountain (1,500 meters); 3. Mountain (1,843 meters); 4. Mt. (doi) Phipannam or Mt. (doi) Nangkaew (1,500 meters); 5. Mt. (doi) Phacho (2,012 meters); 6. Mountain (several peaks, 1,000 meters); 7. Mountain (1,500 meters); 8. Mountain (1,500 meters); 9. Manhok Gap; 10. Mountain (1,000 meters); 11. Phihonyoothin Highway (at kilometer marker #117 on the Lampang - Chiangrai Road; 505.8 meters above sea-level) at the provincial boundary between Ngao District, Lampang Province and Phayao District, Chiangrai Province. 12. Mt. (doi) Khunyuam #2 (1,741 meters) and finally 13. the Luang Phrabang Mountains, about eight kilometers east of Mt. Khunyuam #1.

This mountain range passes through the following administrative areas: 1. It is the border between Fang District and Chiangdao District, Chiang Mai Province for 52 kilometers. 2. It is the provincial boundary between Phrao District and Doisaket District, Chiang Mai Province and Wiangpapao District, Chiangrai Province for 68 kilometers. 3. It is the provincial boundary between Wangnua District, Lampang Province and Wiangpapao District, Chiangrai Province for 74 kilometers. 4. It is the provincial boundary between Wangnua District, Lampang Province and Maesuai District, Phan District, and Phayao District, Chiangrai Province for 60 kilometers. 5. It is the provincial boundary between Ngao District, Lampang Province and Phayao District, Chiangrai Province for 50 kilometers. 6. It is the boundary between Phayao District, Chiangkham District

and Pong District, Chiangrai Province for 90 kilometers. 7. It is the provincial boundary between Pong District and Chiangkham District of Chiangrai Province and Thungchang District, Nan Province for 18 kilometers.

9. Phanomdongrak - This mountain range begins at Takoo Pass which is the provincial border between Nangrong District, Buriram Province and Taphraya Sub-District, Aranyaprathet District, Prachinburi Province. It stretches generally easterly and when it reaches border marker-post #28, this range is the boundary between Thailand and Cambodia until it reaches Huaiselamphao Peak, when it turns northeast for 54 kilometers. Then it turns north to the right bank and mouth of the Mun River in the area of Bandan District, Ubonrachathani. This is the end of the range and this section is the border between Thailand and Laos. Its total length is 544 kilometers.

From Takoo Pass to the Huaiselamphao Mt., water from the northern slope flows down to the Mun River. From the southern slope water flows down to Phratabong Lake. From Huaiselamphao to the mouth of the Mun River water from the northern and western slopes flows down to the Mun River. Water from the southern and eastern slopes flows down to the Mekong River.

This mountain range includes the following mountains, passes, and border posts: 1. Takoo Pass; 2. Baranae Pass; 3. Border marker #28; 4. Taphet Pass; 5. Border marker #27; 6. Mt. (Phanom) Maekai (532 meters); 7. Kanthopphet Pass and border marker #26; 8. Saitaku Pass and border marker #25; 9. Chanthakahom Pass and border marker #24; 10. Tamuan Pass and border marker #23; 11. Samet Pass and border marker #22; 12. Krang Pass; 13. Mountain (296 meters); 14. We Pass and border marker #21; 15. Border marker #20; 16. Kantheung Pass; 17. Taleng Pass and border marker #19; 18. Doonkaew Pass with border marker #18; 19. Plottang Pass and border marker #17; 20. Wayi Pass and border marker #16; 21. Chom Pass and border marker #15; 22. Border marker #14; 23. Chook Pass and border marker #13; 24. Pradek Pass (Promtok) and border marker #12; 25. Sekyia Pass and border marker #11; 26. Border marker #10; 27. Border marker #9; 28. Border marker #8; 29. Border marker #7; 30. Border marker #6; 31. Kun Pass and border marker #5; 32. Border marker #4; 33. Phrik Pass and border marker #3; 34. Tanka Pass and border marker #2; 35. Ken Pass and border marker #1; 36. Samroong Pass; 37. Priachambok Pass; 38. Huasao Pass; 39. Mengcha Pass; 40. Phraphalai Pass; 41. Thapu Pass; 42. Pheungphraphut Pass; 43. Mountain (662 meters); 44. Noonao Pass; 45. Mt. (Phanom) Trob (520 meters); 46. Mt. Phanhomwihan (657 meters); the site of the Phrawihan castle; 47. Phanhom-

wihan Pass; 48. Tathoo Pass; 49. Mt. Sattasoom (482 meters); 50. Duanduan Pass; 51. Mountain (309 meters); 52. Tamphaka Pass (223 meters); 53. Mt. (phanon) Chat (283 meters); 54. Phooi Pass; 55. Anma Pass; 56. Mt. (phanon) Phengsung (652 meters); 57. Mountain (734 meters); 58. Mt. (phanon) Sampoow (Sampeuw) (about 700 meters); 59. Mt. (phanon) Dongrak (761 meters; 60. Priachambak Pass; 61. Bok Pass; 62. Khrutha Pass; 63. Poongdaeng Pass; 64. Khammet Pass; 65. Plakang Pass; 66. Banphai Pass; 67. Mt. (phanon) Daenmuang (439 meters); 68. Banko Pass; 69. Banhuaiphung Pass; 70. Thapkung Pass; 71. Huaisua Pass; 72. Nang Pass; 73. Phrankratai Pass; 74. Wangmon Pass; 75. Mek Pass. There is a Warin - Phibun - Mek Pass road on the way to Champasak that goes over this pass. 76. Khumthong Pass; 77. Katin Pass.

This mountain range passes through the following administrative areas: 1. It is the provincial boundary between Taphraya Sub-District, Aranyaprathet District, Prachinburi Province and Nangrong District, Buriram Province for 32 kilometers. 2. It passes through Lahansai Township, Lahansai Sub-District, Nangrong District; Bangku Township, Prakhoonchai District; Bankruat Township, Bankruat Sub-District, Prakhoonchai District, Buriram Province for 54 kilometers. 3. It passes through Bakdai Township and Tabao Township, Prasat District; Dan Township and Buachet Township, Sangkha District, Surin Province for 118 kilometers. 4. It passes through Soon Township and Pruyai Township, Khukhan District; Kansom Township and Bakdong Township, Khunham District; Lalai Township, Sam Township, Rung Township and Bungmalu Township, Kansalak District, Srisaket Province for 124 kilometers. 5. It passes through Takas Township, Soong Township, Doompradit Township, and Nachaluai Township, Detchaudom District; Huaikha Township, Phoonngam Township, and Kholaen Township, Buntharik District; Noonklang Township and Kutchomphu Township; Phibunmangsahan District; and Khoongchiam Township, Bandan District, Ubonratchathani Province for 216 kilometers

10. Phechanbun - This mountain range actually consists of two ranges. They begin in the north at the source of the Pasak River in Phoonsung Township, Dansai District, Lei Province and then they separate and go south in two ranges along both sides of the Pasak River.

Phechanbun #1 - This range is the one to the east of the Pasak River. It extends southeast for approximately 40 kilometers and then goes due south to the mountain which the Suranarai Highway crosses (about 34 kilometers east of the Pasak River). This is the end of the range which is, in all, about

236 kilometers long. This range extends on to the south but is then called the "Dongphayayen Range".

This range includes the following mountains: 1. Mountain (500 meters); To the northeast the foothills of this mountain join the foothills of Mt. (phu) Kradung. To the south of the juncture of these foothills is the source of the Phong River. 2. Mt. Talukaingong (Talukaingom) (500 meters); 3. Mt. Phayafo (Phayapo or Phayapho) (500 meters); 4. Mountain (500 meters); 5. Mountain (600 meters); 6. Mountain (600 meters); 7. Mountain (600 meters); 8. Mt. Phanghei (900 meters); 9. Mountain (600 meters); to 10. Suranarai Highway (about 500 meters above sea-level).

This range passes through the following administrative areas: 1. It passes through Phoongsung Township, Ipum Township, and Wangyao Township, Dansai District, Lei Province for 12 kilometers. 2. It is the provincial border between Wangsaphung District, Lei Province and Lomkao District, Phechanbun Province for 18 kilometers. 3. It passes through Namnao Township, Lomkao District, Phechonbun Province for 12 kilometers. 4. It is the provincial border between four provinces: Wangraphung District, Lei Province; Chumphae District, Khonkaen Province; Lomkao District, Lomsak District, Muang Phechonbun District, and Wichianburi District, Phechonbun Province; and Muangchaiphumi District and Bamhenchonrong District, Chaiphumi Province for 194 kilometers.

Phechanbun #2 - This range is the one to the west of the Pasak River. It passes along the Phechanbun-Lei Highway from about kilometer post #100 to kilometer post #90 and then turns south through Mt. Loomloo, Mt. (phu) Kaewkong and Mt. (phu) Miang, then turns west for about eight kilometers. Then it goes south along the area of Phitsanulok Province and through the Mitraphap Highway (Phitsanulok - Lomsak). At the source of the Thalo Canal it enters Phechanbun Province through Mt. Sankamphaeng where the Taphanhin-Phechanbun Highway crosses. It then enters Nakhon Sawan Province and ends at the Suranarai Highway (Khooksamroong-Choho) about 20 kilometers east of Khooksamromg District, Lopburi Province. In all, this range is about 350 kilometers long. Water from the eastern slope of this range flows down the Pasak River, and water from the western slope flows down to the Nan River and the Chaophraya River.

This mountain range includes the following mountains: 1. Mt. Loomloo (1,666 meters); 2. Mt. (phu) Kaewkong (1,500 meters); 3. Mt. (phu) Miang (2,000 meters); 4. Friendship Highway (Mitraphap) (Phitsanulok-Lomsak) at the source of Thaho Canal; 5. The Taphanhin-Phochanbun Highway crosses this range about six kilometers east of Chondaen District. 6. Mt. Sankamphaeng (500 meters); 7. Mountain (200 meters); 8. Mt. Mai-

daeng (200 meters); 9. Mt. Loomnang (500 meters); 10. Mt. Soidao (540 meters); 11. Mt. Samorat (500 meters); 12. Mt. Kloichai (500 meters); 13. Mt. Chanakat (500 meters); to 14. Suranarai Road (20 kilometers east of Khooksamroong District).

This mountain range passes through the following administrative areas: 1. It passes through Phoonsung Township, Ipum Township, Banpoong Township and Koksathon Township, Dansai District, Loei Province for about 30 kilometers. 2. It passes through Wangban Township and Banneun Township, Lomkao District, Phechanbun Province for about 28 kilometers. 3. It is the provincial boundary between Lomkao District, Lomsak District and Muang District, Phechanbun Province and Nakhonthai District, Phitsanulok Province for 50 kilometers. 4. It passes through Nangua Township and Palao Township, Muang Phechanbun District; Wangpoong Township, Chondaen Township, and Thakham Township of Chondaen District; Nachaliang Township, Muang Phechanbun District; and Banphoot Township, Tharoong Township and Srakuat Township, Wichianburi District, Phechanbun Province for 144 kilometers. 5. It is the provincial border for three provinces at Thatakoo District and Nongbua District, Nakhonsawan Province; Wichianburi District, Phechanbun Province; and Khooksamroong District, Lopburi Province for 42 kilometers. 6. It is the border between Khooksamroomg District and Chaibadan District, Lopburi Province for 56 kilometers.

11. Phuket - This mountain range continues from the base of Mt. Hinlu at kilometer post #34,267 on the Phechankesom Road (the Chumphan-Pakchan section), and is a continuation of Tanawsri Range. It stretches to the south where in Phangnga Province, it turns to the southeast. When it enters Krabi Province it turns south-southeast to Nakhonsrithammarat Province where it goes northeast to the base of Mt. Khuha in the Nakhonsrithammarat Range. Its total length is 517 kilometers. Water from the eastern slope flows down to the Gulf of Siam and water from the western slope flows down to the Kraburi River and to the Sea of Andaman and Straits of Malacca.

This mountain range includes the following mountains: 1. Mt. Hinlu (557 meters); 2. Mt. Khanang (598 meters); 3. Mt. Namlotnoi (470 meters); 4. Mt. Plaihuaihinphroong (366 meters); 5. Mt. Daen (612 meters); 6. Mt. Plaikhlongtindaen (499 meters); 7. Mt. Chan (444 meters); 8. Mt. Maedaen (694 meters); 9. Mt. Nomsao (1,134 meters); 10. Mountain (947 meters); 11. Mountain (813 meters); 12. Mountain (945 meters); 13. Mountain (854 meters); 14. Mt. Photachoongdoong (970 meters); 15. Mountain (561 meters); 16. Mountain (1,023 meters); 17. Mt. Langkhatuk (1,232 meters); 18. Mountain (1,032 meters); 19. Mountain (1,307 meters); 20. Mountain (1,392 meters); 21. Mountain (1,466 meters); 22. Mountain

(1,250 meters); 23. Mountain (1,420 meters); 24. Mountain (546 meters); 25. Mountain (700 meters); 26. Mountain (604 meters); 27. Mountain (763 meters); 28. Mountain (550 meters); 29. Mountain (561 meters); 30. Mountain (767 meters); 31. Mountain (704 meters); 32. Mountain (862 meters); 33. Mt. Nomsao (869 meters); 34. Mountain (712 meters); 35. Mountain (840 meters); 36. Mountain (634 meters); 37. Mountain (576 meters); 38. Mountain (731 meters); 39. Mt. Sok (904 meters); 40. Mountain (645 meters); 41. Mt. Chomnamkhang (805 meters); 42. Mt. Phanombencha (1,397 meters); 43. Mt. Chongsiat (500 meters); 44. Mt. Pra (400 meters); 45. Mt. Yaiyottam (200 meters); 46. Mt. Samchom (655 meters). This range ends where its foothills meet the foothills of the Nakhonsrithammarat Range at kilometer marker #751 on the southern branch of the railroad from Bangkok. It is 60.54 meters above sea-level at that point.

This mountain range passes through the following administrative areas: 1. It is the provincial boundary between Muang Chumphan District and Sawi District of Chumphan Province, and Kraburi District, Ranong Province for 40 kilometers. 2. It passes through Bangkaew Township and Launnua Township, Laun Sub-District, Muang District, Ranong Province for 34 kilometers. 3. It is the provincial border between Laun Sub-District, Muang Ranong District and Muang District of Ranong Province, and Langsuan District and Phato Sub-District, Langsuan District, Chumphan Province for 80 kilometers. 4. It is the provincial border between Kapeu Sub-District, Muang District, Ranong Province and Chaiya District, Thachang District, and Khirirattanikhom District, Suratthani Province for 76 kilometers. 5. It is the provincial boundary between Sub-District Kawkhokhao of Takuapa District, Kapong District, Muang Phangnga District and Thapput District, Phangnga Province, and Khirirattanikhom District, Phanom Sub-District of Khirirattanikhom District, Phrasaeng District, Suratthani Province for 101 kilometers. 6. It is the provincial boundary between Phanom Sub-District of Khirirattanikhom District and Prasaeng District Suratthani Province, and Aoluk District and Muang District, Krabi Province for 60 kilometers. 7. It passes through Khaodin Township, Khaophanom Township and Khookyang Township of Muang Krabi District; Sinpun Township, Phela Township, Phrudinna Township, and Lamthap Township of Khlongthom District, Krabi Province for 70 kilometers. 8. It passes through Kurae Township and Prik Township of Thungyai District and Bangkhan Township, Naphot Township, Khuankrot Township, Nonghong Township and Chamai Township of Thungsong District, Nakhonsrithammarat for 56 kilometers.

12. Sankalakhiri - This mountain range separates the Thai and Malaysian Border from the western seacoast of the

Malayan Peninsula in Satun Province east to the source of the Koo-Lok River in Waeng District, Narathiwat Province for 428 kilometers. Water from the northern slopes splits into two parts. The first part, from border post #1 to Mt. China (Chin), flows down to the Strait of Malacca. From here east to the end of the range, the water flows into the Gulf of Siam. Water from the southern slopes of this range flows into Malaysia.

This mountain range includes the following border posts and mountains: 1. Border post #1 at Patupute on the seacoast; 2. Border post #2 at Mt. Wia (205 meters);3.Border post #3; 4. Border post #4; 5. Mt. Wangkunung (496 meters); 6. Border post #5; 7. Border post #6 at Mt. Wangkluang (527 meters); 8. Border post #7 at Mt. Wangmu (540 meters); 9. Border post #8; 10. Mt. China (723 meters), where there is the Nakhonsritham-marat Range which goes north to Suratthani Province; 11. Mt. Nasikring (300 meters); 12. Border post #9; 13. Border post #10; 14. Border post #11; 15. Border post #12 at Mt. Kamning (350 meters); 16. Border post #13; 17. Border post #14; 18. Border post #15; the Padangbesa Railroad is between border posts #14 - #15. 19. Border post #16 at Mt. (khuan) Nailong (95 meters); 20. Border post #17; 21. Border post #18 at Mt. (khuan) Sung (103 meters); 22. Border post #19; 23. Border post #20; 24. Border post #21; 25. Border post #22 at Mt. (khuan) Maidam or Mt. Kayuitam (90 meters). The Sadao-Alosata Road is to the east of and close to border post #22. 26. Border post #23; 27. Border post #24; 28. Border post #25; 29. Border post #26; 30. Border post #27; 31. Border post #28; 32. Border post #29; 33. Mt. Mai (758 meters); 34. Border post #30 (201 meters); 35. Border post #31; 36. Border post #32; 37. Border post #33. 38. Border post #34; 39. Border post #35; 40. Border post #36; 41. Mt. Plaithap (642 meters); 42. Border post #37; 43. Border post #38 (370 meters); 44. Border post #39; 45. Border post #40 at Mt. Pakeuteubang (569 meters); 46. Border post #41; 47. Mt. Raembai (500 meters); 48. Border post #42; 49. Border post #43 (591 meters); 50. Border post #44; 51. Border post #45 at Mt. Lanak (906 meters); 52. Mt. Khasahutan (1,063 meters); 53. Mt. Bubut (1,120 meters); 54. Border post #46 at Mt. Rae (1,009 meters); 55. Border post #47; 56. Mt. Mudinbasa (1,076 meters); 57. Border post #48; 58. Mountain (1,138 meters); 59. Border post #49; 60. Mt. Latapapalang (1,265 meters); 61. Mt. Kubangbadak (1,113 meters); 62. Mt. Prengkan (1,001 meters); 63. Border post #50 (not found on the map); 64. Border post #51 at Mt. Kapachulu (447 meters); 65. Border post #52 at Mt. Simpangpre (360 meters); the Betong-Pinang Road is to the east of and close to border post #52; 66. Mt. Padangpannaring (329 meters); 67. Border posts #53 and #54 are on the northern and southern sides, respectively, of Mt. Padangpannaring; 68. Mt. Kobae (894 meters); 69. Mountain (1,008 meters); 70. Border post #55 at Mt. Lipae

(950 meters); 71. Mt. Khuarimo (1,131 meters); 72. Border post #56 at Mt. Beutam (or Mt. Sannaha) (706 meters); 73. Mt. Hankun (1,415 meters); 74. Mt. Hulutitipasa (1,535 meters); 75. Mountain (1,186 meters); 76. Border posts #57 - #58 are located on ether side of the footpath that goes over the ridge of the range; 77. Mountain (731 meters); 78. Mt. Hulumaka (1,472 meters); 79. Mt. Hulumara (1,442 meters); 80. Border post #59 at Mt. Huludakang (869 meters); 81. Border post #60 at Mt. Juatsante (578 and 640 meters); 82. Border post #61; 83. Mt. Ulakaoo (792 meters); 84. Border post #62 (not on the map); 85. Mt. Liso (881 meters); 86. Border post #63 at Mt. Baru (771 meters); 87. Border post #64 (not on the map); 88. Border post #65; 89. Border post #66; 90. Border post #67 (not on the map); 91. Mt. Tapoo (869 meters); 92. Border post #68; and 93. Mt. Yeli (Yali) (875 meters) which is the end of the range; 94. Border posts #71 - #72 are at the source of the Koo-Lok River.

This mountain range passes through the following administrative areas: 1. It passes through Puyu Township, Khlong Khut Township and Khuansato Township, Muang District, Satun Province for 40 kilometers. 2. It passes through Thungmo Township and Samnakkaen Township, Sadao District, Songkhlo Province for 71 kilometers. 3. It passes through Prakop Township, Natawi District, Songkhla Province for 18 kilometers. 4. It passes through Khaodaeng Township and Bahoi Township of Sabayoi District, Songkhla Province for 34 kilometers. 5. It passes through Kabang Township and Patae Township of Yaha District, Yala Province for 46 kilometers. 6. It passes through Bannangsata Township, Thamthalu Township, and Maewat Township of Bannangsata Province for 30 kilometers. 7. It passes through Ayyeuweng Township, Tanaomaerao Township and Betong Township of Yala Province for 132 kilometers. 8. It passes through Mamoong Township and Loochut Township of Waeng District, Narathiwat Province for 57 kilometers.

13. Sankamphaeng - This mountain range starts at an unnamed mountain (1,297 meters). It is the range which meets Mt. Khiaw (1,270 meters) in Muang District, Nakhon Nayok Province and goes up to Mt. Laem. From here it goes southeast and beyond Mt. Kamphaeng it goes south for about six kilometers. Then it turns northeast and crosses the Nakhonratchasima-Kabinothburi Highway after which it turns southeast to Mt. Lamang. It continues on and turns east to the end of the range at Takoo Pass. Water from the northern slope of this range flows down to the Takhong Canal, Phraphleung Canal and the Plaimat Canal. Water from the southern slope flows down to the Namsai Canal, Sai Canal, Saiyoi River, and the Phraprong River. Water from the section of the range in Taphraya Sub-District flows down into Cambodia.

This mountain range is the provincial boundary between Pakchong District, Pakthongchai District and Khanburi District of Nakhonratchasima Province and Nangrong District, Buriram Province, and Pakphli District, Nakhonnayok Province; Prachantakham District, Kabinthaburi District, Srakaew District, Wattananakhan District, Taphraya Sub-District of Aranyaprathet District, Prachinburi Province for 185 kilometers.

The Sankamphaeng Mountain Range includes the following mountains: 1. Mountain (1,297 meters); 2. Mt. Laem (1,328 meters); 3. Mountain (1,002 meters); 4. Mt. Poongchannan (947 meters); 5. Mt. Kamphaeng (848 meters); 6. Mountain (836 meters); 7. Mt. Iphrom (806 meters); 8. Mountain (643 meters); 9. Nakhonratchasima-Kabinthaburi Highway; 10. Mountain (504 meters); 11. Mountain (765 meters); 12. Mountain (812 meters); 13. Mountain (419 meters); 14. Mt. Lamang (992 meters); 15. Mountain (about 1,000 meters), and many more peaks until reaching the end of the range at Takoo Pass.

14. Luang Phrabang - This mountain range begins on the right bank of the Mekong River in Muangyai Township, Chiangkhong District, Chiangrai Province from whence it stretches south. It is the boundary between Thailand and Laos as far as Phumiang or the source of the Huainamman in the area of Denlek Township, Nampat District, Utradit Province, which is the end of the range. It is 448 kilometers long. Water from the eastern slope of this range all flows into the Mekong River, whereas water from the western slope is separated into two sections. Water from the first section, from north to south, to 19° 31' north latitude, 100° 34' east longitude, flows down via various streams and the Ing River to the Mekong River. Water from the second section, from 19° 31' north latitude, 100° 34' east longitude to Phumiang, flows down to the Yom River and the Nan River.

This mountain range includes the following mountains: 1. Mt. Pamunhuailoo (1,704 meters); 2. Mt. Pakhunhuailoo (1,758 meters); 3. Mt. Phall (1,559 meters); 4. Mt. Phuphungkat (1,447 and 1,564 meters); 5. Mt. (doi) Changkoong (1,100 meters); 6. Mt. Mun (1,704 meters); 7. Mt. (doi Khunyuam #1 (1,663 meters); 8. Kiwsala Pass; 9. Huailoo Pass; 10. Mountain (2,061 meters); 11. Mt. Phucham (1,600 meters); 12. Mt. (doi) Luang Phrabang (2,069 meters); 13. Mt. Phulo (1,000 meters); 14. Mt. Phudat (1,000 meters); 15. Mt. Phupui (1,200 meters); 16. Mt. (doi) Yi (1,630 meters); 17. Salatintok Pass; 18. Mt. (doi) Lakmun (1,474 meters); 19. Mt. Phudu (800 meters); 20. Mt. Phuthongaen (1,212 meters); 21. Mountain (860 meters); 22. Mt. Phunongyai (1,550 meters); 23. Mt. Phusoidao (2,100 meters); 24. Mt. Phumiang (2,300 meters).

This mountain range is in the following administrative

areas: 1. It is the national boundary in Chiangkhong District and Chiangkham District for 84 kilometers. 2. It is the national boundary in Thungchang District, Pua District, Muang-nan District, Sa District and Nanoi District, Nan Province for 274 kilometers. 3. It is the national boundary in Faktha District and Nampat District of Uttaradit Province for 90 kilo-meters.

III. Rivers

A. Rivers Originating In the Chanthaburi Mountain Range

Northern side - There is no important river. The water flows down various streams and canals to the Phraprong River, the Prachinburi River and the Bang Pakong River.

Southern side - 1. The Chanthaburi River originates between Mt. Soidaonua and Mt. Chongkhaeb in Thamai District, Chanthaburi Province. It flows southwest through Muang Chant-haburi District into the Gulf of Siam in Laemsing District, Chanthaburi Province. It is about 100 kilometers long.

2. The Prasae River originates between Mt. Yai (Plailam-krayang) and Mt. Angkraden in Phanatnikhom District, Chonburi Province and flows south into Rayong Province through Kalseng District and into the Gulf of Siam. It is about 80 kilometers long.

3. The Rayong River originates west of Mt. Ruataek in Banbung District, Chonburi Province. It flows south into Rayong Province through Bankhai District and into the Gulf of Siam in Muang Rayong District. It is about 60 kilometers long and is also called the Yai Canal or Ban Canal. The section that flows through Muang Rayong District is called the Rayong River.

B. Rivers Originating In the Dongphayayan Mountain Range

Eastern and northern sides - 1. The Cheungkrai Stream has its source between two unnamed mountains (both 600 meters high) about eight kilometers from the Suranarai Road where the road crosses the mountain range and goes southeast. It is called "Samnaksapbon" in Dankhunthat District, Nakhonratchasima Province where it flows due east through Dankhunthat District and Noonthai District. It is the boundary between Noonthai District and Muang Nakhonratchasima District. It enters Noonsung District and flows into the Mun River at its left bank at the border between Noonsung District and Phimai District, Nakhon-ratchasima Province. This stream is about 140 kilometers long. It is called the Chaingkrai Stream where is passes through Dankhunthot District.

2. Takhong Stream has its source in the mountains to the north of Mt. Falami in Pakchong District, Nakonratchasima Province. It flows north through Sikhiw District, Sungneun District and Muang Nakhonrathcasima District, then it turns to the east and flows into the left bank of the Mun River in Chakrat District. It is about 210 kilometers long.

Western and southern sides - 1. Water flows via various streams to the Pasak River.

2. Muaklek Stream has its source at Mt. Inthani in Pakchong District, Nakhonratchasima Province. It flows west into Sraburi Province and down to the left bank of the Pasak River in Kaengkhoi District. It is about 75 kilometers long.

3. The Nakhonnayok (Yoothaka) River has its source at Mt. Inthani in Muang District, Nakhonnayok Province. At its source it is called various names. It flows south through Muang Nakhonnayok District and then turns slightly southwest. When it reaches Ongkhrak District it turns south where it is known as the Yoothaka River. Then it flows into the right bank of the Prachinburi River at the intersection of the boundaries of three provinces, Ongkhrak District, Nakhonnayok Province; Bangnampriaw District, Chacheungsao Province; and Bansang District, Prachinburi Province. It is about 100 kilometers long.

C. Rivers Originating In the Daenlao Mountain Range

Western and northern sides - The water flows into Burma.

Eastern side - 1. The Kok River has its source in the mountains south of Muang Chiangtung, Burma. It flows south through Muong Kok and Muang Sat, in Burmese territory for 180 kilometers and then enters Thailand four kilometers west of Mt. (doi) Samsao. Once it enters Thai territory the river turns southeast in Fang District, Chiang Mai Province, then it enters Muang District, Chiangrai Province. When it gets to the site of the city it turns northeast through Maechan District and Chiangsaen District into the right bank of the Mekong River in Chiangsaen District. This river is about 110 kilometers long in Thailand and about 290 kilometers long overall.

The Fang River and the Lao River are tributaries that flow into the right bank of the Kok River. The source of these rivers is in the northern side of the Phipannam Mountain Range.

2. The Ruat River has its source at Mt. Doiphaleng to the south of Muang Chiangtung. It flows northeast 45 kilometers and then turns and goes straight southeast. It enters Thailand (right where it joins with the Sai River) in Maesai District, Chiangrai Province and flows through this province and into the right bank of the Mekong River in Chiangsaen Province (here it is called the "Sopruat" and the marker stone #111 is buried on

the Thai shore north of Ban Sopruat). This river flows through Burma for 80 kilometers and it serves as the Thai-Burmese border from the point where the Sai River joins it to Sopruat, a distance of 40 kilometers. Its total length is about 120 kilometers.

The Sai River is a tributary and flows into the right bank of the Ruat River.

3. The Sai River has its source northwest of Muang Thum in Burma. It flows southeast and when it is about one kilometer from the Thakhilek Bridge (across from Maesai District), it is the border between Thailand and Burma all the way to where it joins the right bank of the Ruat River in Maesai District, Chiangrai Province.

The Sai River is 80 kilometers long in Burma and 15 kilometers long in Thailand, making an overall length of 95 kilometers.

Southern side - 1. The Ping River has its source at Mt. (doi) Thuai which is west of Muang Na Pass in Chiangdao District, Chiang Mai Province. It flows south through Chiangdao District, Maetaeng District, Sansai District, Maerim District, Muang Chiang Mai District, Sanphi District, Hangdong District, Sanpatong District, and Chomthong District. It then enters Lamphun Province and passes through Muang Lamphun District, Pasang District and Banhoong District. Then it switches back into Hot District, Chiang Mai Province and Li District, Lamphun Province after which it enters Tak Province where it passes through Samngao District, Bantak District (north of Ban Pakwang in this district the Wang River joins the Ping River on its left bank), and Muangtak District. It then enters Kamphaeng phechan Province where it passes through Muang Kamphaengphechan District, Khlong Khalung District and Khanuwanlaksaburi District. It then enters Nakhonsawan Province and passes through Banphataphisai District, Khlongkhalung District and Khanuwanlaksaburi District. It then enters Nakhonsawan Province and passes through Banphataphisai District and Muang Nakhonsawan District as far as Paknamkhoo Township. The Nan River flows into the left bank of the Ping River in Khaewyai Township of this same district. It is about 600 kilometers long and it eventually becomes the Chaophraya River.

It is said that in ancient times the Ping River was called the "Phoo River" from the point where the Wang River flows into it. At the mouth of the Ping, where it joins the Nan River, it is called the "Paknamphoo".

Tributaries that flow into the right bank of the Ping River are the Haeng River, Taeng River and the Chaen River. Tributaries that flow into the left bank of the Ping River are the Kuang River, Li River and the Wang River.

2. The Haeng (Taeng) River has its source at Mt. (doi) Pukpafaek in Chiangdao District, Chiang Mai Province. It flows

south through Chiangdao District and when it gets close to Maetaeng District it turns southeast. This section of the river is called the Taeng River and it flows into the right bank of the Ping River in Maetaeng District. This river is about 135 kilometers long.

D.. Rivers Originating In the Tanawsri Mountain Range

Eastern side - 1. The Khaewnoi River has its source in the Songjakua River, the Bikhi River and the Ranti River, which get their water from the Tanawsri Range and the Thanonthongchai Range. These rivers come together south of Camp Samsop or north of Ban Thadindaeng in Sub-District Sangkhala, Thongphaphumi District, Kanchanaburi Province from which point they are called the Khaewnoi River. This river flows southeast through Thongphaphumi District, Sai Yot Sub-District, Muang Kanchanaburi District. It runs into the right bank of the Srisawat River (Khaewyai) at Pakphraek Township above the Thai Paper Mill. The river ends in Muang Kanchanaburi District. This river is about 270 kilometers long.

The Phachi River is a tributary flowing into the Khaewnoi River.

The Songkalia River has its source between Mt. Luphoowi and Phrachedisamong in the Tanawsri Range where it separates from the Thanonthongchai Range in Sangkhala Sub-District, Thongphaphumi District, Kanchanaburi Province. It flows south and is about 45 kilometers long.

The Bikhi River has its source between Phrachedisamong and Mt. Mayantong in the Tanawsri Range in Thongphaphumi District, Kanchanaburi Province. It flows north and, when it gets close to the seat of Sangkhala Sub-District, Thongphaphumi District, it turns east. It is about 50 kilometers long.

The Ranti River has its source between Mt. Yai and Mt. Ngiyai in the Thanonthongchai Range in Sangkhala Sub-District, Thongphaphumi District, Kanchanaburi Province. It flows southwest and is about 40 kilometers long.

2. The Phachi River has its source in a mountain range that is a branch of the Tanawsri Range (the section above Mt. Wanmi) in Chambung District, Ratchaburi Province. It flows north into Muang District, Kanchanaburi Province and then into the right bank of the Khaewnoi River at Ban Nongbua in the same district. It is about 120 kilometers long.

3. The Phechonburi River has its source between Mt. Yekyetong (which is in the Tanawsri Range) and the Phaneunthung Range in Thayang District, Phechonburi Province. It flows north, then turns east into Banlat District, and once again turns north and enters Muang Phechonburi District. Then it enters Banlaem District and turns northeast and flows into the Gulf of Siam. It is about 230 kilometers long.

4. The Pranburi River has its source in the range south of Mt. Phaneunthung in Thayang District, Phechonburi Province. It flows south almost parallel to the Tanawsri Range into Prachuapkhirikhan Province through Huahin District. Then it turns east into Pranburi District and flows into the Gulf of Siam. It is about 140 kilometers long.

5. The Thataphao (Chumphan) River has its source where the Thusae and Rapro Canals flow together in Thasae District, Chumphan Province. It flows south and when it reaches Muang Chumphan District it turns southeast and flows into the Gulf of Siam. It is about 40 kilometers long. From the seat of Muang Chumphan District east to the sea it is usually called the Chumphan River.

The Thasae Canal has its source between an unnamed mountain (598 meters high) and Mt. Kathakhrop in Bangsaphan District, Prachuapkhirikhan Province. It flows south into Thasae District, Chumphan Province where it joins with Rapro Canal. It is about 95 kilometers long. The Rapro Canal has its source between Mt. Daen and Mt. Khamu of the Tanawsri Range in Thasae District, Chumphan Province. It flows southeast where it joins with the Thasae Canal. It is about 80 kilometers long.

6. The Chumphan Canal has its source between Mt. Khanang of the Phuket Mountain Range and Mt. Natathen which is the border between Sawi District and Muang District, Chumphan Province. It flows north in Muang Chumphan District until it approaches close to the Phechonkesom Road (the Chumphan-Pakchan section) and then it turns east and south of this road. When it reaches to where the southern branch of the railroad crosses the canal, it turns south and flows into the Gulf of Siam and the Gulf of Thungkha. This canal is about 60 kilometers long.

Western side - 1. The Kraburi (Pakchan) River has its source in the Hankadiang Canal and the Kranei Canal which meet in Kraburi District, Ranong Province. It flows straight southwest through Kraburi District and Laun Sub-District of Muang Ranong District to the Sea of Andaman. It is about 135 kilometers long. This river gets its first water from the Tanawsri Range, later it gets water from the Phuket Range, and it is the boundary between Thailand and Burma throughout its length. At its mouth it is an estuary 4.5 kilometers wide.

In former times, before the Phechonkesom Road was built and there was only the Chumphan-Pakchan Road, there was a steamer docked at Pakchan which made trips to Ranong Province and Phuket Province because the Chan Canal flowed into the left bank of the Kraburi River at Pakchan. Therefore, the section of the Kraburi River from this point to the sea was known as the Pakchan River.

The Hankadiang Canal has its source at Mt. Khonboon in Burma. It flows south where it joins the right bank of the Kranei Canal. It is about 17 kilometers long.

The Krasei Canal is the boundary between Thailand and Burma throughout its length. It has its source in the mountain range that branches off from the Tanawsri Range between Mt. Daeng and Mt. Plaikhlongsatung in Kraburi District, Ranong Province. It flows southwest and joins with the left bank of the Hankadiang Canal. It is about 15 kilometers long.

E. Rivers Originating In the Thanonthongchai Mountain Range

Eastern side - 1. The Chaem River has its source in the mountains that lie about 35 kilometers north of the Pangkia Pass in Maechaem District, Chiang Mai Province. It flows south past the seat of Maechaem District and there turns east to the right bank of the Ping River at the border of Chomthong District and Hot District. It is about 170 kilometers long.

2. The Tun River has its source right at the pass where there is a footpath crossing the mountains between Omkoi District and Maesariang District, Maehongson Province. In Omkoi District, Chiang Mai Province it flows northeast about 25 kilometers. When it reaches the seat of Omkoi District it turns south and stays in this district. It enters Samngao District, Tak Province and when it reaches Bansutta it turns northeast to the right bank of the Ping River. It is about 150 kilometers long.

3. The Sakaekrang River has its source south of Mt. Mookoochu (this mountain branches off from the Thanonthongsai Range) at the provincial border between Khlongkhalung District, Kamphaengphechan Province and Latyao District, Nakhonsawan Province. It flows east and is the boundary between Khlongkhalung District and Khanuwonlaksaburi District, Kamphaengphechan Province, and Latyao District, Nakhonsawan Province. This port of the river, from its source to where the water flows between Mt. Chonkan (538 meters) and an unnamed mountain (529 meters), is called Maewong Canal or Maeremaewong Canal. From this point it flows southeast into Latyao District, Nakhonsawan Province (above the Latyao District seat it is usually called Maewong Canal and south of this seat it is called the Maenamwangma). Then it is the provincial boundary between Koorokphra District and Phayuhakhiri District, Nakhonsawan Province, and Thapthan District and Muang District, Uthaithani. After it enters Muang Uthaithani District it is called the Sakaekrang and it flows into the right bank of the Chaophraya River two kilometers south of Manoorom District, Chainat Province. It is about 180 kilometers long.

4. The Maeklong River (Srisawat, Khaewyai, Ratchaburi)

has its source between Mt. Khonlinsotripik, which is on the border between Thailand and Burma, and an unnamed mountain (1,787 meters) in Umphang District, Tak Province. It flows south into Kanchanaburi Province and turns slightly southeast through Sangkhala Sub-District, Thongphaphumi District and Srisawat Sub-District, Muang Kanchanaburi District where it joins the Khaewnoi River (from its source to this point the natives call it the Khaewyai or Srisawat River). From this point it turns southeast through Thamuang District and Thamaka District into Ratchaburi Province, where it is called the Ratchaburi River. When it reaches Bampoong District it turns south through Phootharam District. When it reaches Muang Ratchaburi District it turns southeast through Damneunsaduak District and enters Samutsongkhram Province where it is called the Maeklong River. It passes through Bangkhonthi District, Amphawa District and Muang Samulsongkhram District into the Gulf of Siam. It is about 520 kilometers long.

The Khaewnoi River is a tributary and flows into the right bank of this river.

The Khakhaeng and the Tapheun are important streams that are tributaries flowing into the left bank of the Maeklong. The Khakhaeng Stream has its source south of Mt. Plaihuaikha-khaeng (this mountain is in the same range as Mt. Mookoochu (see the Sakaekrang River). It stretches south and is the boundary between three provinces, including Umphang District, Tak Province; Latyao District, Nakhonsawan Province; and Thapthan District, Uthaithanni). It flows south into Thapthan District, Uthaithani Province and Srisawat Sub-District, Muang District, Kanchanaburi Province where it turns west to the left bank of the Maeklong River in this sub-district. It is about 130 kilometers long.

Western side - 1. The Pai River has its source in the mountains where the Thanonthongchai Range meets the Daenlao Range in Pai District, Maehongson Province. It flows south, and after passing Pai District, it turns west through Muang Maehongson District and leaves Thai territory, between border posts 10A and 10B, and flows into the Khong River in Burma. It is about 180 kilometers long (135 kilometers in Thailand).

2. The Yuam River has its source in the mountains to the south of Pangkia Pass in Khunyuam District, Maehongson Province. It flows west and after passing Khunyuam District it turns south through Maesarieng District and then turns west to the Mei River. It is about 215 kilometers long.

3. The Mei River has its source between an unnamed mountain (921 meters) and Mt. Khokphoochoo. It flows northwest into Burmese territory until it reaches the right bank of the Koli Canal. This section is 25 kilometers long. It is also the border between Thailand and Burma in Maesot District and

Thasongyang District of Tak Province and it flows into the left bank of the Khong River (four kilometers to the west of Mt. Lekhayahe) in Maesariang District, Maehongson Province. It is about 385 kilometers long (it is the Thai border for 360 kilometers).

F. Rivers Originating In the Nakhonsrithammarat Mountain Range

Western side - 1. The Luang River (see Phuket Mountain range - northern side).
2. The Trang River (see Phuket Mountain Range - southern side).

Eastern side - 1. There are short unimportant rivers that originate in the mountains and flow down to various streams, canals, rivers, and finally to the Gulf of Siam.

G. Rivers Originating In the Banthat Mountain Range

Eastern side - 1. All the water flows via various streams and canals, into Cambodia.

Western side - 1. The Yai Canal has its source in the Aeng Canal and the Sato Canal which flow together in Khaosaming District, Trat Province and then flow south to the Gulf of Siam in Muang Trat District. It is about 49 kilometers long. At its source this river is called the Khaosaming Canal and at its mouth it is called the Trat River.

H. Rivers Originating In the Phipannam Mountain Range

Northern side - 1. The Fang River has its source near to Huathoo (on the Chiang Mai-Fang Road) which separates Fang District and Chiangdao District from Phrao District in Chiang Mai Province. In Fang District it flows north and after passing the seat of Fang District it turns northeast into the right bank of the Kok River in Fang District 12 kilometers below Banthaton. It is about 70 kilometers long.
2. The Lao River has its source on the northern side of Mt. (doi) Phacho in Wiangpapao District, Chiangrai Province. It flows north through Wiangpapao District and Maesuai District. After passing the seat of Maesuai District it turns northeast through Phan District and Muang Chiangrai District to the right bank of the Kok River in Muang Chiangrai District. It is about 200 kilometers long.
3. The Ing River gets its water from the Kwanphayao in Phayao District, Chiangrai Province (the Kwanphayao gets its water from various streams on the northern side of this mountain,

the side that separates Wangnua and Ngao Districts of Lampang Province from Phaya District, Chiangrai Province). The river flows northeast in Chiangrai Province through Phayao District, Phan District, Chiangkham District, Theung District and Chiangkhong District to the right bank of the Mekong River in Chiangkhong District. It is about 240 kilometers long.

Western side - 1. The Kuang River has its source at Mt. (doi) Phipannam in Doisalet District, Chiang Mai Province. It flows southwest through Doisalet District, Sankampheeng District and Sanphi District and then enters Lamphun Province where it passes through Muang Lamphun District and Pasang District to the left bank of the Ping River in Pasang District. It is about 105 kilometers long.

A tributary of the Kuang River is the Tha River which flows into its left bank. The Tha River is the border between Muang Lamphun District and Pasang District for about 90 kilometers.

Southern side - 1. The Wang River has its source in the mountains at approximately 19° 21' north latitude, 99° 34' east longitude in Wangnua District, Lampang Province. It flows south through Wangnua District, Chaehom District, Muang Lampang District, Kaokha District, Sopprap District, Theun District and Maephrik District. Then it enters Tak Province where it passes through Samngao District and Bantak District where it joins the left bank of the Ping River above Banpakwang in Bantak District. It is about 300 kilometers long.

The Chang River is a tributary which flows into the left bank of the Wang River. It is about 115 kilometers long. Its source is to the east of the Phopratupha Temple in Muang Lampang District and it flows southwest. The northern branch of the railroad crosses it at the Maechang Bridge. It goes through Maetha District and joins the Wang River south of the Kaokha seat.

2. The Yom River has its source at Mt. (doi) Chunyuam #2 in Pong District, Chiangrai Province. It flows southwest straight through Pong District into Phrae Province where it passes through Song District, Rongkwang District, Muang Phrae District, Sungmen District, Long District and Wangchin District. Then it turns south and enters Sukhothai Province where it passes through Srisatthanalai District, Sawankhalook District, Srisamroong District, Muang Sukhothai District and Kongkrailat District. Then it enters Phitsanulok Province where it passes through Bangrakam District and enters Phichitan Province where it passes through Samngam District, Muang Phichitan District and Phoothale District. Then it enters Nakhonsawan Province where it passes through Chumsaeng District and joins the right bank of the Nan River in front of the Wat Phrathatubankeichai

in Chumsaeng. It is about 550 kilometers long.

The Ngao River is a tributary that flows into the right bank of the Yom River. It is about 85 kilometers long. The source of the Ngao River is at Kiwmanhok in Ngao District, Lampang Province. It flows southeast into Nan Province and joins the Yom River in Song District, Phrae Province.

3. The Li River has its source in mountains that branch off from the Phipannam Range at Mt. (doi) Phacho (this range stretches south past Mt. (doi) Khuntan, Mt. Thamkhuntan, etc. to Samngao District, Tak Province; water from the eastern slope flows down to the Wang River and water from the western slope flows down to the Li River and the Ping River) in Li District, Lamphun Province. It flows to the north and after passing through Banhoong District, Lamphun Province it turns northwest into Pasong District, Lamphun Province and finally it joins the left bank of the Ping River. It is about 130 kilometers long.

I. Rivers Originating In the Phanomdongrak Mountain Range

Northern side - 1. The Plaimat Stream has its source in many streams that, in turn, get their water from the Sankamphaeng Range and flow together in Khanburi District, Nakhonratchasima Province. It flows northeast into Buriram Province through Nangrong District (the Nangrong Canal joins the right bank of the section of this river which is close to the border of Lamplaimat District). It passes through Lamplaimat District into Nakhonratchasima Province where it passes through Phimai District and joins the right bank of the Mun River in Prathai Sub-District, Buayai District. It is about 210 kilometers long.

2. The Nangrong Canal has its source between Takoo Pass and Takiw Pass in Nangrong District, Buriram Province. It flows north until it is about five kilometers from the border in Lamplaimat District; then it flows into the right bank of the Plaimat Stream in Lamplaimat District. It is about 90 kilometers long.

3. The Chi Stream has its source between Chankahom Pass and Tamuan Pass. It flows straight north and is the provincial boundary between Prasat District, Muang Surin District and Thatum District, Surin Province and Bannokruat District, Prakhoonchai District, Krasang District and Satuk District of Buriram Province for its entire length. It flows into the right bank of the Mun River in Thatum District, Surin Province. It is about 160 kilometers long.

4. Khayung Stream has its source between Thapu Pass and Pheungphraphut Pass in Kantharalak District, Srisaket Province. It flows north through Kanthararom District and into the right bank of the Mun River between the border of Kanthararom District,

Srisaket Province and Warinchamrap District, Ubonratchathani Province. It is about 145 kilometers long.

5. Doomyai Stream has its source between Mt. (phanom) Sampoow (Sampiew) and Mt. (phanom) Dongrak in Detchaudom, Ubonratchathani Province. It flows north through Detchaudom District into the right bank of the Mun River between the border of Warinchamrap District and Phibunmangsahan District, Ubonratchathani Province. It is about 180 kilometers long.

6. Doomnoi Stream has its source between Poongdaeng Pass and Khammek Pass in Buntharik District, Ubonratchathani Province. It flows north through Buntharik District, Phibunmangsahan District and Bandan District, Ubonratchathani Province and into the right bank of the Mun River in Bandan District. It is about 130 kilometers long.

Southern and eastern sides - The water flows via various streams to Phratabong Lake in Burma and into the Mekong River in Laos.

J. Rivers Originating In the Phechanbun Mountain Range

Phechanbun #1 Range - 1. The Phong River has its source in the valley of this range and Mt. Phukradung in Wangsaphung District, Lei Province. It flows south and turns east and is the boundary between Wangsaphung District, Lei Province; Nongbualamphu District and Noonsang District, Udonthani Province; and Chumphae District and Phuwiang District of Khonkaen Province. When it reaches the seat of Namphong District, it turns south through Muang Khonkaen District and joins the left bank of the Chi River at the border of Muang Khonkaen District and Koosumphisai District, Mahasankham Province. It is about 275 kilometers long.

The Cheun River is a tributary to the right bank of the Phong River.

2. The Cheun River has its source at Mt. Talukaingong (Talukaingom) in Chumphae District, Khonkaen Province. It flows slightly southeast through Chumphae District and then is the provincial boundary between Chumphae District, Khonkaen Province and Phukhiaw District, Chaiphumi Province. Then it turns up and goes straight northeast and is the provincial boundary between Phukhiaw District, Chaiphumi Province and Nongrua Sub-District, Muang District, Khonkaen Province. It then flows into the right bank of the Phong River at the boundary of Phuwiang District and Muang Khonkaen District. It is about 180 kilometers long.

The Phrom River is a tributary that flows into the right bank of the Cheun River.

3. The Phrom River has its source in the range that branches off from Mt. Phayafo (Phayapo or Phayapho) in Khonsan District, Chaiphumi Province. It flows slightly northeast into

Ketsatonsombun District, Chaiphumi Province and then turns northeast into Khonsan District again. It flows into the right bank of the Cheun River in Khonsan District. It is about 80 kilometers long.

4. The Chi River has its source at Mt. Phayafo (Phayapo or Phayapho) in Ketsatonsombun District, Chaiphumi Province. It flows southeast through this district, Chatrat District and Bankhwao District into Muang Chaiphumi District and then turns east and southeast. Then it turns back north through Phukhiaw District, Chaiphumi Province and enters Khonkaen Province where it turns northeast through Phon District, Manchakhiri District, Banphai District and Muang Khonkaen District. It then enters Mahasankham Province and Muang Mahasankham District, after which it enters Kanlin Province and passes through Komlasai District. Then it enters Roiet Province and passes through Muang Roiet District, Phoonthong District, Thawaiburi District, Selaphumi District, Atchasamarot District and Phanomphrai District. It then enters Ubonratchathani Province and passes through Yasoothon District, Khamkhuanhaew District, Mahachanachai District and Khuangnai District. Then it joins the left bank of the Mun River right at the boundary of Khuangnai District and Warinchamrap District. It is about 765 kilometers long.

The Phong River and Lampang River are tributaries that flow into the left bank of the Chi River and the Lamkhanchu is a tributary flowing into the right bank.

5. The Lamkhanchu has its source to the south of Phanghei Mt. in Bamnetnarong District, Chaiphumi Province. It flows south past the District seat about 12 kilometers and then turns northeast into Chatrat District and into the right bank of the Chi River. It is about 105 kilometers long.

Phetchonbun Range #2 - 1. The Khaewnoi River has its source at Mt. (phu) Suantaen (which is in the range that branches off from Mt. (phu) Miang in the Luang Phrabang Range, a long range that stretches south to meet the Phetchonbun #2 range; this mountain is the provincial border between Dansai District, Lei Province and Nakhonthai District, Phitsanulok Province). It flows 20 kilometers south in Nakhonthai District and when it reaches the seat of Nakhonthai District it turns northwest. Then it turns southwest again in Nakhonthai District and enters Watboot District where it turns southwest to the left bank of the Nan River where it serves as the boundary for both these provinces. It is about 185 kilometers long.

2. The Khlongthako (Wangthong) River has its source in Khek Canal (eight kilometers long) and Khekyai Canal (15 kilometers long) which both get their water from this range and flow down to meet along the southern part of and close to Phitsanulok-Lomsak Road in Wangthong District, Phitsanulok Province. It flows west in Wangthong District and when it

reaches the District seat it turns straight south and is the border between Bangrakam and Muang Phitsanulok Districts. It enters Bangrakam District, Phitsanulok Province and then enters Muang District, Phichitan Province and flows into the left bank of the Nan River. It is about 135 kilometers long. The section of the river in Wangthong District is usually called the Wangthong River.

Western side of the Phetchonbun #1 and the eastern side of Phetchonbun #2 Ranges - 1. The Pasak River has its source in the north where these ranges come together in Dansai District, Lei Province and form a valley. It flows south into Phetchonbun Province through Lomkao District, Lomsak District, Muang Phetchonbun District and Wichianburi District. Then it enters Lopburi Province and passes through Chaibadan District into Sraburi Province through Kaengkhoi District, Muang Sraburi District and Saohai District. Then it enters Phranakhonsriayutthaya Province. When it reaches Tharua District it turns back southwest through Nakhonluang District and flows into the left bank of the Chaophraya River at Pomphechan, Phranakhonsriayutthaya District, Pranakhonsriayutthaya Province. It is about 500 kilometers long.

The Muaklek Stream is a tributary that flows into the left bank of the Pasak River.

2. Muaklek Stream (see western and southern sides of Dongphayayen Range).

K. Rivers Originating In the Phuket Mountain Range

Western side - The Kraburi River gets its water primarily from the Phuket Range (see western side of the Tanawsri Range).

Southern side - 1. The Trang River has its source in the Nakhonsrithammarat Mountain Range (northern side of Mt. Khuha) in Thungsong District, Nakhonsrithammarat Province. It flows southwest (west of Thungsong Station) and then receives water from the Phuket Range. It goes straight into Trang Province through Huaiyot District, Sikao District and Muang Trang District into the Straits of Malacca in Kantang District. It is about 175 kilometers long. Native inhabitants have called this river the Thachin River from far back in history, because it is the biggest and widest river in that area and boats in the 300 - 400 ton class could navigate it as far as Kantang District.

Eastern side - 1. The Langsuan River has its source at the mountain right at the border of Kapen Sub-District, Muang District, Ranong Province and Phato Sub-District, Langsuan District, Chumphon Province. It flows north in Phato Sub-District and when it enters Langsuan District it turns east and flows into

the Gulf of Siam. It is about 100 kilometers long.

2. The Khriririrat (Phumduang) River has its source between Mt. Nomsao (869 meters) and Mt. Sok in Khiriratnikhom District, Suratsathani Province. It flows east about 60 kilometers and then turns northeast. When it reaches the seat of Khiriratnikhom District it turns east and flows into the left bank of the Tapi River two kilometers west of the Phunphim District seat. It is about 120 kilometers long and is also known as the Phumduang River.

Northern side - The Tapi River has its source at Mt. Yaiyottam in Thungyai District, Nakhonsrihammarat Province. It flows north (the left bank of the river receives water from the Phuket Range while the right bank receives water from the Nakhonsrithammarat Range) and passes through Thungyai District and Chawang District, Nakhonsrithammarat Province. It enters Suratsathani Province and passes through Phrasaeng District, Bannasan District and Phunphin District. When it is north of the Phunphin District seat it turns east through Muang Suratsathani District and flows into the Gulf of Siam. It is about 232 kilometers long.

The Khirirat River is a tributary flowing into the left bank of the Tapi River.

L. Rivers Originating In the Sankalakhiri Mountain Range

Southern side - All water from this side of the range flows into Malaysia.

Eastern side - The Koo-Lok River has its source at Mt. Yeli (Yali) right at the end of the range. It is the river separating Thailand and Malaysia in Waeng District, Narathiwat Province. It flows straight northeast through Waeng District, Sungai Koo-Lok District and Takboi District and into the Gulf of Siam in Takbai District. It is about 80 kilometers long.

Northern side - 1. The Pattani River has its source between Mt. Latapapalang and Mt. Hankut which are the boundary between Thailand and Malaysia in Betong District, Yala Province. It flows north through Betong District, Bannangsata District, and Muang Yala District into Pattani Province where it passes through Khookphoo District, Yarang District, Nongchik District and Muang Pattani District. It flows into the Gulf of Siam in Muang Pattani District and is about 190 kilometers long.

2. The Saiburi River has its source between Mt. Unkaoo and Mt. Tapoo which are the border between Thailand and Malaysia in Waeng District, Narathiwat Province. It flows north through Waeng District, Rangae District and Rusao District. When it enters Raman District, Yala Province it turns east into Saiburi District, Pattani Province and flows into the Gulf of Siam in

Saiburi District. It is about 170 kilometers long and is also called the Taluban River.

3. The Taphao River has its source between Mt. (khuan) Nailong and Mt. (khuan) Maidam which form the border between Thailand and Malaysia in Sadao District, Songkhla Province. It flows north through Sadao District and Hatyai District and into Songkhla Lake in Hatyai District. It is about 80 kilometers long.

M. Rivers Originating In the Sankamphaeng Mountain Range

Northern side - 1. Water flows down via various streams to Takhong Stream.

2. Phraphleung Stream has its source between an unnamed mountain (836 meters) and Mt. Iphrom in Pakthongchai District, Nakhonratchasima Province. It flows northwest until it reaches Banbukhanun in this district when it turns north about 20 kilometers. As it continues it turns northeast into Chookhachai District, Nakhonratchasima Province and flows into the left bank of the Mun River. It is about 120 kilometers long.

3. The Mun River has its source between Mt. Wong and Mt. Lamang in Pakthongchai District, Nakhonratchasima Province. It flows east and its first section, about 10 kilometers long, is called Hupplakang. As it continues it becomes the Mun River. It flows northeast through Pakthongchai District, Khonburi District and Chookchai District of Nakhonratchasima Province and then turns north into Chakrat District and Phimai District. Then it turns east through Prathai Sub-District, Noonsung District, Nakhonratchasima Province and enters Buriram Province where it flows through Phitthathaisong District, Satuk District and Chumphonburi District into Surin Province. In this province it flows through Thatum District and Rattanaburi District into Roiet Province where it flows through Suwannaphumi District into Srisaket Province through Rasisaila District, Muang Srisaket District and Kanthalarom District. Then it enters Ubonratthathani Province where it passes through Muang Ubonratthathani District, Warinchamrap District, Phibunmangsahan District and Bandan District. It flows into the right bank of the Mekong River (right at the end of the Phanomdongrak Mountain Range) in Bandan District. It is about 641 kilometers long.

The Phrapheung Stream, Takhong Stream, Chi River, Se Stream and Sebok Stream are tributaries flowing into the left bank of the Mun River, while the Plaimat Stream, Chi Stream, Khayung Stream, Doomyai Stream and Doomnoi Stream are tributaries flowing into the right bank of the Mun River.

Southern side - The Bangpakong River (Prachinburi, Paetriw) has its source where the Numan and Phraprong Rivers meet in

Kabinthaburi District, Prachinburi Province. At that point it is called the Prachinburi River. It flows southwest between Srimahaphoothi District and Prachantakham District of Prachinburi Province and then turns to the north through Muang Prachinburi District. Later it turns south through Bansang District into Chachoengsao Province. Here it is called the Paetriw River and it passes through Bangnampriaw District, Bangkhla District, Muang Chachoengsao District and Banphoo District. Then it is called the Bangpakong River as it passes through Bangpakong District and flows into the Gulf of Siam between Bangpakong District and Muang Chonburi District. This river is about 230 kilometers long.

The Nakhonnayok River is a tributary that flows into the right bank of the Prachinburi River.

The Numan River has its source in many long streams, Sainoi Stream, Saiyai Stream, Chan Stream, and Huaiyang Stream, which get their water from this range. These streams flow together at Banpakruam in Kabinthaburi District, Prachinburi Province where they form the Numan River. It flows south into the right bank of the Phraprong River in the same district. It is about 25 kilometers long.

The Phraprong River has its source in this range right at the border of Srapaew District and Wattananakhon District, Prachinburi Province. It flows south in Wattananakhon District about 35 kilometers and then it flows southwest about 30 kilometers in the same district. As it continues it enters Srakaew District and turns straight northwest into Kabinthaburi District, Prachinburi Province where it meets the left bank of the Numan River 500 meters east of the seat of Kabinthaburi District. It is about 160 kilometers long. The section of this river that lies in Wattananakhon District is called the Patong Stream.

N. Rivers Originating In the Luang Phrabang Mountain Range

Eastern side - All water from this side of the range flows, via various streams, down into Laos and down the Mekong River.

Western side - 1. The Nan River has its source between Mt. (phu) Cham, in this range, and Mt. (doi) Khunnanlai in Pua District, Nan Province. It flows north into Thungchang District of the same province and then turns south through Pua District once again. It enters Muang Nan District, Sa District and Nanoi District and then enters Utaradit Province where it passes through Thapla District. When it reaches Nampat District it turns west until it reaches Muang Utaradit District where it turns south once again through Tron District and Phichai District. Then it enters Phitsanulok Province where it passes

through Phonhomphiram District, Taphanhin District and Bangmunnak District into Nakhonsawan Province where it passes through Chumsaeng District. Then it enters Muang Nakhonsawan District and meets the left bank of the Ping River at Khaewyai Township, Muang Nakhonsawan District. It is about 740 kilometers long.

The Yom River is a tributary which flows into the right bank of the Nan River, and the Pat River is a tributary which flows into the left bank.

2. The Pat River has its source between Mt. (doi) Lakmun and Mt. (phu) Du in Faktha District, Utaradit Province. It flows straight southwest through Faktha District and Nampat District and then into the left bank of the Nan River at the border of Nampat District and Thapla District, Utaradit Province. It is about 105 kilometers long.

o. Rivers In the Central Region

The Chaophraya River begins where the Ping River and the Nan River meet in Nakhonsawan Provinve, at Paknampho and Khaewyai Township, Muang Nakhonsawan District. It flows south through Korokphra District and Phayuhakhiri District, Nakhonsawan Province and becomes the border between Muang Uthaithani District Uthaithani Province and Manoorom District, Chainat Province. In Chainat Province it passes through Watsing District, Muang Chainat District and Sanphaya District into Singburi Province where it passes through Inthaburi District, Muang Singburi District and Phonhomburi District. Then it enters Angthong Province where it passes through Chaiyoo District, Muang Angthong District and Pamook District into Phranakhonsriayutthaya Province where it passes through Bangban District, Phranakhonsriayutthaya District and Bangpain District. Then it enters Pathumthani Province and passes through Samkhook District and Muang Thumthani District into Nonthaburi Province where it passes through Pakkret District and Muang Nonthaburi District. As it flows on it is the border between Phranakhon Province and Thonburi Province. It enters Samutprakan Province and passes through Phrapradaeng District and Muang Samutpraka District to the Gulf of Siam between Laemfapha Township and Thaiban Township, Muang Samutprakan District. It is about 360 kilometers long.

The Sakaekrang River is a tributary flowing into the right bank of the Chaophraya River and the Pasak is a tributary flowing into the left bank of this river.

The Thachin River, Noi River and the Lopburi River branch off from the Chaophraya River.

1. The Thachin River (Makhamtao, Suphannaburi, Nakhonchaisri) branches off from the Chaophraya River between Thasung Township, Muang Uthai District and Hatthasao Township, Muang Chainat District. It flows west to the seat of Watsing District,

Chainat Province where it turns south and is called the Makhamtoo River. In Chainat Province it passes through Muang Chainat District and Hankha District into Suphannaburi Province where it is called the Suphannaburi River. It passes through Deumbangnangbuat District, Samchuk District, Sriprachan District, Muang Suphannaburi District, Bangplama District and Songphinong District into Nakhon Pathom Province where it is called Nakhonchaisri River. Here it passes through Banglen District, Nakhonchaisri District, and Samphran District into Samutsakhon Province where it is called the Thachin River. It passes through Krathumbaen District, Banphaew District and Muang Samutsakhon District and into the Gulf of Siam between Bangyaphraek Township and Krookkrak Township of Muang Samutsakhon District. It is about 300 kilometers long.

2. The Noi River branches off from the right bank of the Chaophraya River at Chainat Township, Muang Chainat District. It flows southwest through Sankhaburi District, Chainat Province into Singburi Province through Bangrachan District and Phonhomburi District. Then it turns south into Angthong Province and flows through Phoothong District and Wisethchaichan District into Phranakhonsriayutthaya Province where it passes through Phakhai District and Sena District. Just slightly beyond the Sena District seat the Noi River joins with the Bangban Canal, which is the old Chaophraya River, at Ban Sikuk. Then it turns southeast again and flows back to the right bank of the Chaophraya River to the east of the Bangsai District seat. It is about 145 kilometers long.

3. The Lopburi River branches off from the left bank of the Chaophraya River at Muangmu Township, Muang Singburi District. It flows southeast into Lopburi Province through Thawung District until it reaches Muang Lopburi District where it again turns south. It enters Phranakhonsriayutthaya Province where it flows through Banphraek District, Maharat District, Bangpahan District and Phranakhonsriayutthaya District. It joins the Pasak River at Wattongpu in Phranakhonsriayutthaya District. It is about 85 kilometers long.

P. Rivers in the Northeastern Region

This region is a vast territory and runs the gamut in geography: To the north there is the Mekong River; to the east is the Mekong River and the Phanomdongrak Mountain Range; to the south is the Sankamphaeng Mountain Range and the Phanomdongrak Mountain Range; to the west are the Phechonburi and Dongphayayen Mountain Ranges. Brooks, streams, canals, and rivers in the northern part, which represents one-third of the total area of this region, finally flow into the Mekong River. Water in the remaining two-thirds, the southern part, flows entirely into the Mun River because there is a natural barrier which

separates the water going to the northern and southern parts. This barrier starts with Mt. (phu) Kradung in the northeast and slants south past the Wangsaphong District seat in Lei Province. Then it enters Utaradit Province and goes north of the Nongbualamphu District seat. When it reaches Mt. (phu) Phan it turns southeast and then goes northeast between Muang Udonthani District and Noonsang District. Further on there are hills between Nonghan District and Nonghankumphawapi; and hills and mountains separate Sawangdaendin District, Warichaphumi District and Muang District of Sakonnakhon Province from Kumphawapi District, Udonthani Province and Kuchinarai District, Kalasin Province. Mountains form the boundary between Khamchai District, Nakhonphanom Province and Leungnoktha District, Ubonratchathani Province. Mountains and hills in Ubonratchathani form the boundary between Nakae District, Nakhonphanon Province and Chanuman District, Ubonratchathani Province; then they turn above the Trakanphuchaphon District seat and form the boundary between Khemrat District and Khongchiam District. The end of the line of hills is at the right bank of the Mekong River at Huaiyang Township, Bandan District. The division of water brought about by this natural barrier is as follows.

Northernside (water flows to the Mekong River) - 1. The Huang River has its source at Mt. Phuphaitan in Nakhonthai District, Phitsanulok Province. It flows north 10 kilometers and then turns east to Ban Latkhaek where the Namman Stream joins it (the Namman Stream is the border between Thailand and Laos; it has its source at Mt. (phu) Miang in the Luang Phrabang Mountain Range and it flows from north to south). To this point it is 20 kilometers long. From Ban Latkhaek the Huang River goes straight through Lei Province until it turns southeast in Dansai District. Then it turns northeast in Thali District and enters Chiangkhan District where it joins the right bank of the Mekong River. This section is about 110 kilometers long. The section of the river in Lei Province serves as the border between Thailand and Laos. Overall, this river is about 130 kilometers long.

2. The Lei River has its source in the mountains that adjoin Mt. (phu) Kradung on the north in Wangsaphung District, Lei Province. It flows north through Muang Lei District into the right bank of the Mekong River in Chiangkhan District. It is about 130 kilometers long.

3. The Songkhram River has its source between Mt. (phu) Phalek, Mt. (phu) Phahak and Mt. (phu) Phaleun which form the provincial boundary between Sawangdaendin District, Sakonnakhon Province and Nonghan District and Kumphewapi District, Utaradit Province. It flows north and is the provincial boundary between Kumphawapi District and Nonghan District, Utaradit Province and Sawangdaendin District and Wanraniwat District, Sakonnakhon

Province. Then it turns northeast for about 30 kilometers and then turns southeast and is the provincial border between Phoonphisai District, Seka District and Bungkan District, Nongkhai Province and Wanraniwat District, Sakonnakhon Province. It enters Nakhonphanom Province and passes through Srisongkhram District and Thauthen District and flows into the right bank of the Mekong River below Banchaiburi in Thauthen District. It is about 420 kilometers long.

4. The Namkam Stream gets its water from the Han Swamp, Muang District, Sakonnakhon Province (this swamp receives water from various streams to the north, west and south of it.) It flows straight southeast through Muang Sakonnakhon District into Nakhonphanom Province through Nakae District and Thatuphanom District. Then it flows into the right bank of the Mekong River in Thatuphanom District. It is about 90 kilometers long.

Southern side (water flows into the Mun River) - 1. The Pao Stream receives water from the Hankumphawapi Swamp in Kumphawapi District, Utaradit Province (this swamp receives water from the Phaichan Stream and various other streams to the east, west and north of the swamp). It flows southeast and becomes the boundary between Kumphawapi District, Utaradit Province and Sahatkhan District, Kalasin Province for 55 kilometers (at this point the Phanchat Stream joins the left bank of the Pao Stream). It enters Kalasin Province and passes through Sahatkhan District, Muang Kalasin District and Komlasai District into the left bank of the Chi River right at the border between Komlasai District, Kalasin Province and Muang District, Roiet Province. It is about 195 kilometers long.

The Phaichan Stream has its source at Mt. (phu) Phelin, on the southeastern side of the mountain in Kumphawapi District, Utaradit Province. It flows west and becomes the boundary between Nonghan District and Kumphawapi District. As it continues it turns north about 12 kilometers in Nongham District, Utaradit Province and then turns west and flows into the swamp in the same province. It is about 55 kilometers long.

2. Se Stream (Sebai) has its source between Mt. (phu) Takdaet and Mt. (phu) Tum in Leungnoktha District, Ubonratchathani Province. It flows south through Leungnoktha District, Khankhuankaew District and Amnatchareun District. It then turns southeast, where it is called the Sebai Stream, through Khuangnai District, Muang Samsip District and Muang Ubonratchathani District, where it flows into the left bank of the Mun River. It is about 200 kilometers long.

3. The Sebok Stream has its source in hills in the southern part of Amnatchareun District, Ubonratchathani Province. It flows straight southeast through Amnatchareun District, Phana District, Trakanphutchaphon District and Muang Ubonratchathani District. It flows into the left bank of the Mun River at the

border between Muang Ubonratchathani District and Phibunmangsahan District. It is about 115 kilometers long.

4. The Yang River has its source between Mt. (phu) Thambung and Mt. (phu) Khookyak in Kuchinarai District, Kalasin Province. It flows south into Roiet Province and passes through Phoonthong District and Selaphumi District into the left bank of the Chi River on the border between Selaphumi District, Roiet Province and Yasoothon District, Ubonratchathani Province. It is about 165 kilometers long.

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CHAPTER 2

CLIMATE

I. Topography

A. Location - Thailand lies within the Torrid Zone, in Southeast Asia, in the center of the Indo-China Peninsula between 5° 37' and 20° 27' north latitude, and 97° 22' and 105° 37' east longitude. It contains approximately 518,000 square kilometers or 200,000 square miles.

B. Borders - Thailand is bordered on the north by Burma and Laos; on the east by Laos and Cambodia; on the south by the Gulf of Siam and Malaysia; and on the west by Burma, the Sea of Andaman and the Strait of Malacca.

II. Topographical Divisions Based on Meteorology

For the sake of convenience, meteorologically Thai topography is divided into five regions, according to their differing climatic conditions, as follows:

A. The Northern Region - This region is high above sea-level with several mountain ranges scattered throughout. Going from north to south, there is the Daenlao Mountain Range which forms the border. To the west there is a part of the Thanonthongchai Range and the Tanaosri Range which stretch south. To the east is the Luang Prabang Range and part of the Phetchonbun Range. In the center of this region is the Phipannam Range. Between these mountain ranges is the important river basin formed by the Ping, Wang, Yom and Nan Rivers which flow south to Muang District, Nakhonsawan Province and formed the Chaophraya River. The mountain ranges already mentioned have an average height of about 1,600 meters above sea-level. The highest peak

in this region, and in Thailand, is Mt. Inthanon which is about 2,595 meters above sea-level.

B. The Northeastern Section - The topography is a high plateau similar to an inverted plate which slopes to the southeast. It begins with the provinces of Kalasin, Khonkaen and Chaiphumi and slopes toward the provinces of Ubonratchathani and Nakhonratchasima. On the western side of this region is the Phetchonbun Mountain Range and the Dongphayayen Mountain Range which have peaks ranging in height from 800 - 1,300 meters above sea-level. On the southern side of the region are the Sankamphaeng and the Phanomdongrak Ranges which form the boundary between Thailand and Cambodia. The Phanomdongrak Range is about 400 meters high but some peaks reach as high as 700 meters. The northern and eastern sides of this region are bordered by the Mekong River which flows between Thailand and Laos. In the center of this region are the Chi and Mun Rivers which flow together in Ubonratchathani Province and then flow on down to the Mekong River.

C. The Central Region - The topography is a flat river basin which slopes to the south, from Phitsanulok Province down to the Gulf of Siam. The western side is bounded by the Tanaosri and Thanonthongchai Mountain Ranges. The east is bounded by the Dongphayayen and Sankamphaeng Mountain Ranges.

There are several rivers in the central region, such as the Chaophraya River, the Thachin River, the Mae Klong River and the Bangpakong River which flow into the Gulf of Siam. There are also some small ranges of mountains in this region. Topographical features such as these make floods a constant threat during the rainy season.

D. The Eastern Shore of the Gulf of Siam - From Chonburi Province down, the topography is mostly large and small mountain ranges. At the easternmost point of this region is the Banthat Mountain Range which forms the boundary between Thailand and Cambodia. To the west is the Chanthaburi Mountain Range. Along the seacoast of this region are many islands, the largest of which is Chang Island. The second and third largest islands are Kut and Khram Islands. The important river of this region is the Ranong River which flows into the Gulf of Siam.

E. The Southern Region - On the western side of this region are the Tanaosri Mountain Range, which is the border between Thailand and Burma, and the Phuket Mountain Range. There are many islands along the eastern and western seacoasts. On the south the Sankalakhiri Mountain Range serves as the border between Thailand and Malaysia and in the center of this region the Nakhonsrithammarat which stretches from north to south. The

important rivers of this region are the Tapi, Pattani and Ko-Lok Rivers which flow down to the sea on the eastern side of the southern region.

III. Classification of Climate in Thailand

Since the topographical features of the various sections already mentioned are not similar, the climate also varies in accordance with the Köppen classification which takes into account average monthy temperatures and rainfall. By this method the climate can be classified in the following two large categories:

A. Tropical Savanna Climate - The area from the Gulf of Siam up to the northernmost section of the country, including the eastern shore of the Gulf of Siam, during the southwest monsoon season is very humid and receives rainfall throughout the season. However, during the northeast monsoon season, or the cold season, the weather in this area is clear and dry. For these reasons the weather in this area is referred to as a tropical savanna climate.

B. Tropical Rainforest or Tropical Monsoon Climate - The area comprising the southern part of the country receives rainfall during both the northeast monsoon season, which is the cold season, and the southwest monsoon season. This is especially true in the coastal area from Chumphon Province southward which receives much rainfall. For these reasons this area's weather is referred to as a tropical monsoon climate.

IV. Climate Controls

The factors which affect the weather in Thailand, in addition to the terrain features already noted, are the two monsoon winds, the northeastern monsoon winds and the southwestern monsoon winds, which consist of various types of air masses that cause climatic changes. The importance of these winds is due to the following:

A. The Northeastern Monsoon (called in ancient times "the kite wind") - During the cold season the monsoon wind blows from the polar region or, in the higher latitudes, from the northeast and east. This monsoon is made up of large air masses which come from two sources:

a. The Modified Polar Siberian Air Mass - This air mass originates in the polar region or Siberia and moves south

across China and the China Sea and into Thailand from the north or northeast. This air mass is cool and dry and creates a steady breeze but when it crosses the Gulf of Siam to the southern part of the country the air mass changes; it becomes warm and moist, the characteristics of the tropical maritime air mass.

b. The Tropical North Pacific Air Mass - When the polar air mass from Siberia has changed and warmed and is returning to the north, it opens the way for the North Pacific maritime air mass which is warmer and more moist than the air mass mentioned above. This air mass enters Thailand from the northeast, east or slightly southeast and causes temperatures to increase to the point that it is hot. Humidity also is increased.

B. The Southwest Nonsoon (called in ancient times "the taxes wind" or "the Salatan wind") - This monsoon blows from the lower latitudes in the southeastern part of the southern hemisphere and when it blows across the equator to the northern hemisphere it changes direction to the southwest. This monsoon consists of two types of air masses:

a. Modified Tropical South Indian Ocean Air Mass - This air mass originates in a high pressure area in the South Indian Ocean, passes over the Bay of Bengal and enters Thailand from the southwest. This air mass is hot and very moist bringing heavy rainfall to the mountainous regions in its path. This type of rain is called mountain rain.

b. Modified Tropical Contentinental Air Mass - This air mass originates over the Australian continent and is dry. When it moves from its source it passes over the Sea of Timor, the Island of Java and large and small islands southwest of the Isle of Borneo and east Samatra; then it enters Thailand, sometimes in the same manner as the maritime air mass. When it has passed the equator it changes from a southerly wind and becomes a southwesterly wind when it crosses into the higher latitudes. This air mass is lower in temperature and humidity than the modified tropical South Indian Ocean air mass.

Of the two air masses that have been mentioned already, the maritime air mass blows with more strength and stability into Thailand than the continental air mass.

In addition to the air masses mentioned already, during the intervals between the two monsoons, that is, between March and April and in October, the following air masses move into Thailand:

During the interval between the northeast monsoon and the southwest monsoon, between March and April, there are rather unstable air currents. The modified Polar Siberian Air Mass, which covers, like a wedge, the central, the northeastern, and the northern regions of Thailand, gradually reverses to the north while picking up heat from the ground. It then opens the way for the tropical North Pacific air mass to move easily into Thailand by way of the South China Sea, the Gulf of Siam, the southern region and the central region of Thailand. When it encounters the maritime wind in the afternoons, it causes strong winds over the central region. It is the steady southerly winds that are so suitable for kite-flying (the junk wind).

In the middle of the changing monsoons there is an air mass from India (the modified tropical Indian air mass) which crosses Eastern Pakistan and the Bay of Bengal and enters Thailand from the west (from the end of April to the beginning of May).

During the time between the change of the southwest monsoon to the northeast monsoon, in October, the air is very unstable due to the modified polar Siberian air mass which starts to move gradually into Thailand from the north until it reaches the Gulf of Siam around the middle of October. At the same time, the warm south polar maritime air mass is gradually reversing back toward the south.

V. Seasons

Due to the nature of the various air masses which move into Thailand, as mentioned above, the seasons are divided meteorologically as follows:

A. The Cold Season or the Northeast Monsoon Season - From November to February the temperatures are cooler than at any other time of the year. The temperature in the northern and northeastern regions is cooler than in the other regions.

B. The Hot Season or the Season Between the Northeast and the Southwest Monsoons - This season is from March to April and it is much hotter in the central and northeastern regions than in the other regions.

C. The Rainy Season or the Southwest Monsoon Season - This season is from May to September. This monsoon blows from the direction already noted and is stable during July. During this time there is rainfall over nearly the entire country. Generally speaking, the heaviest rainfall is in September.

D. The Season Between the Southwest and the Northeast

Monsoons - This is in October. In this month the wind changes from the southwest to the northeast and the rains cease. This occurs in the northern and northeastern regions first.

VI. The Variations of Some Meteorological Elements

Only important variations in meteorological elements will be mentioned here.

A. Air Pressure - The daily variations in air pressure are the same in every part of Thailand. From 0700 hours the air pressure rises steadily until it reaches its highest around 1000 hours. Then it falls to its lowest point at about 1600 hours at which time it rises once again until about 2300 hours. Then it again begins to fall around 0400 hours. As for the seasonal variations in air pressure and their close relationship to the prevailing seasonal winds, they are as follows:

During the cold season or the northeast monsoon season the air pressure that covers Thailand is a high pressure system. In this season the air pressure in Thailand is higher than in other seasons.

During the hot season the air pressure in Thailand weakens and reverses to the north causing a low pressure area due to the temperature rise in the northern region of the country.

During the rainy season the air pressure system which covers the country is a low pressure system and is estimated to be the time of lowest air pressure during the year.

During the season of the change from the southwest monsoon to the northeast monsoon in the northern and northeastern regions there is a steady rise in air pressure reaching as far as the central region. The southern region continues to be a low pressure area.

B. Temperature - The upper part of Thailand, that is, the part from the Gulf of Siam seacoast northward, is a large area and therefore has a large span of hot weather except for the seacoast very close to the Gulf of Siam where a maritime wind reduces the afternoon temperatures somewhat. The highest temperatures during the hot season generally are between 33° - 38° centigrade. April is the hottest month. Generally speaking, during the hot season there is a temperature range (difference between the highest and lowest temperatures) during the day of from 10° - 12° centigrade. The extreme maximum recorded temperature to date in this area was 44.5° centigrade recorded at Uttradit on 27 May 1960. This is also believed to be the record for the entire country. During the cold season there is about a 15° centigrade difference between high and low temperatures;

in the northeastern region the range is about 14° centigrade; and in the central region the range is about 12° centigrade. This shows that in the morning it is rather cool but in the afternoon it is rather hot. During the northeast monsoon, the temperature in the northern and northeastern regions goes much lower than in the other regions. The average low temperature is about 16° centigrade which is considered cold. The average low temperature in the central region is about 20° centigrade. The extreme minimum temperature recorded to date is 0.1° centigrade which was recorded in Loei Province on 13 March 1955. This is believed to be the lowest temperature for all of Thailand since weather records have been kept.

The weather is warm in the southern region throughout the year because it is close to the sea. The highest and lowest temperatures have not been recorded. The temperature averages about 26° centigrade during the northeast monsoon season and about 27° centigrade during the southwest monsoon season. There is very little variation in temperature.

C. Rainfall - Throughout the cold season, from November to February, the upper part of Thailand is rather dry, with scarcely any rain, because of the northeast monsoon winds which are rather cool and dry. During the hot season, that is, March and April, there are thunder showers in some places. At the beginning of May it is clear in the area from the Gulf of Siam northward. Then the rainy season begins in Thailand and the rainfall increases through September, the month of the greatest rainfall. Sometimes a temporary lapse in the rainfall occurs.

In the southern region the rainfall varies from that of the other regions because this region has two rainy seasons. One season is during the southwest monsoon and is clearly manifested along the western coast of the region. The other season is the northeast monsoon or the cold season when there is much rainfall along the eastern coast of the region, especially from Chumphon Province southward.

Generally speaking, there is an average rainfall in Thailand of about 1,620.0 millimeters of 63 inches, but when this is broken down by region, it is seen that the northern and central regions receive less rainfall than the others, whereas the eastern coast of the Gulf of Siam and the southern region receive a rather large rainfall.

The areas that receive the greatest amount of rainfall are the areas along the windward side of the mountain ranges which take the full force of the monsoons in Thailand. Areas of heavy rainfall are the provinces of Ranong, Phangnga, Trat and Chanthaburi. The highest average annual recorded rainfall is 5,302.8 millimeters (208.8 inches), recorded in Ranong Province and the highest actual rainfall recorded for one year is 6,699.5 millimeters (263.6 inches), recorded in Ranong Province in 1946.

The area receiving the least rainfall is that of the provinces on the western side of the country, the area behind the Tanaosri Mountain Range which is the side away from the winds. The lowest recorded average annual rainfall is 847.5 millimeters (37.3 inches), recorded in Tak Province.

D. Relative Humidity - Throughout the northeast monsoon season, from November to February, Thailand receives cool, dry air masses which results in a low relative humidity. December and January is the time of lowest relative humidity and the relative humidity tends to drop in the afternoon, sometimes to as low as 18%. During the hot season, March and April, the relative humidity is higher than during the cold season. Then, as the southwest monsoon winds start to blow into Thailand, the relative humidity greatly increases with averages going up to 80% during the period from August to October.

E. Clouds - From November to March is the period of the least clouds and during this period the sky is mostly clear, especially at night and in the morning, and most of the clouds are cirrus clouds. Throughout the southwest monsoon season cloudiness increases and these are mostly stratus cloud formations and there is scarcely any thunderstorm activity except for a short time in June and then it is usually in the morning. There is, generally speaking, a cloud cover throughout this season.

F. Surface Winds - Surface winds in Thailand vary with the seasons as follows:

During the northeast monsoon season, in the area to the north of the Gulf of Siam the winds usually blow from the north or northeast, but they gradually change until, in February, they are coming from the south. As for the southern region, throughout this season the winds come from the northeast or east.

During the hot season, or changing monsoon season, the prevailing winds in the various regions come from the south in the afternoon and evening; the morning winds vary. In the southern region the wind blows from the south and southeast but in May the winds gradually change until they are coming from the southwest.

During the southwest monsoon season the winds usually blow from the southwest nearly all over the country. Sometimes the winds change to western or southern winds.

During the monsoon-changing season in October the winds change from the southwest to the northeast. At the beginning of the month the winds may still be coming from the southwest but around the middle of October the winds change and come from the northeast or east.

G. Fog - In Thailand the fog begins around November which is the beginning of the cold season. It usually occurs in the northern and northeastern regions and the area along the eastern coast of the Gulf of Siam during the period from December to February. Heavy fog is common and visibility is poor sometimes for nearly entire days. In the hot season, March and April, there is usually a haze which also adversely affects visibility. There is much less fog in the southern region than in the other regions and the area where it most often occurs is from Chumphon Province northward. One thing worth noting is that the fog lasts longer in the mountainous as opposed to the flat terrain.

VII. Cyclones

A cyclone is an area in which the wind blows counterclockwise into a calm center in the northern hemisphere, but clockwise in the southern hemisphere. The calm center of a cyclone is a low pressure area. Most cyclones that enter Thailand originate over the South China Sea; sometimes they originate in the South Pacific.

According to international agreement, when the surface winds close to the calm center of a cyclone are not over 33 knots (61 kilometers per hour) it is called a "depression"; if between 34 - 63 knots (62 - 117 kilometers per hour) it is called a "tropical storm"; and if higher than 64 knots (118 kilometers per hour) it is called a "typhoon".

Thailand is usually not hit by cyclones of "typhoon" strength because the long adjoining mountain ranges serve to sap the strength of the cyclones before they get into Thailand, so that by the time they reach Thailand they are tropical storms or depressions. There are usually two or three cyclones per year that enter Thailand from the east. These usually occur at the end of the southwest monsoon season (September to October). Between June and August and in November and December there are few cyclones. Between January and March Thailand is free of these storms.

At the beginning of the rainy season the cyclones usually start to enter Thailand first by way of the northernmost part. During the middle of the season the cyclones gradually change to a more southerly direction until, by the end of the rainy season, they enter the country via the central region or the area bordering the Gulf of Siam.

According to statistics of cyclones that have struck Thailand that have been kept since the establishment of the Department of Meteorology about 20 years ago, these are some of the important cyclones that caused heavy damage:

1. In September 1942 two cyclones, one following the other, swept across the northeastern and northern regions. They

brought heavy rainfall from the central region northward causing widespread flooding; in the central region, especially, the water level rose very high and stayed high for up to a month.

2. In October 1952 two cyclones hit Thailand but the first disintegrated before doing any damage and the other swept along the coastal area of the Gulf of Siam; therefore it did not cause much flooding as had occurred in 1942, and the eastern coastal area of the Gulf of Siam suffered much greater losses than the other regions.

3. In October 1960 a depression from the South China Sea struck the eastern side of Thailand. It passed by the eastern coast of the Gulf of Siam and skirted along the coast close to Bangkok and then altered its course to the northwest. Losses caused by this depression nearly equalled those inflicted by the 1952 cyclone.

4. In October 1962 a large tropical storm named "Harriet" struck Talumphuk Peninsula in Nakhonsrithammarat. This name is one used in accordance with an agreement between countries bordering the Pacific Ocean and the South China Sea.

The build-up of this cyclone went as follows: on the 24th of October 1962 at 0100 hours the weather report indicated a disturbance in the far South China Sea along the tip of the Vietnam Peninsula close to the Gulf of Siam. By 0700 hours the disturbance had increased to a depression in the vicinity of Poulo Kondor Island off the tip of the Vietnamese Peninsula. At 1300 hours the calm center of the storm was at approximately 8^{o} 1' north latitude 108^{o} east longitude, or right in the area of the Poulo Kondor Island group and appeared to be moving into the Gulf of Siam.

By the 25th of October 1962 at 0100 hours this cyclone had gradually moved into the Gulf of Siam. By 1300 hours the calm center of the cyclone was at approximately 8^{o} 2' north latitude 103^{o} east longitude, or about 180 miles east of Nakhonsrithammarat Province. The wind velocity around the center of the storm was about 30 knots or 54 kilometers per hour. The strength of the storm was still at the depression level.

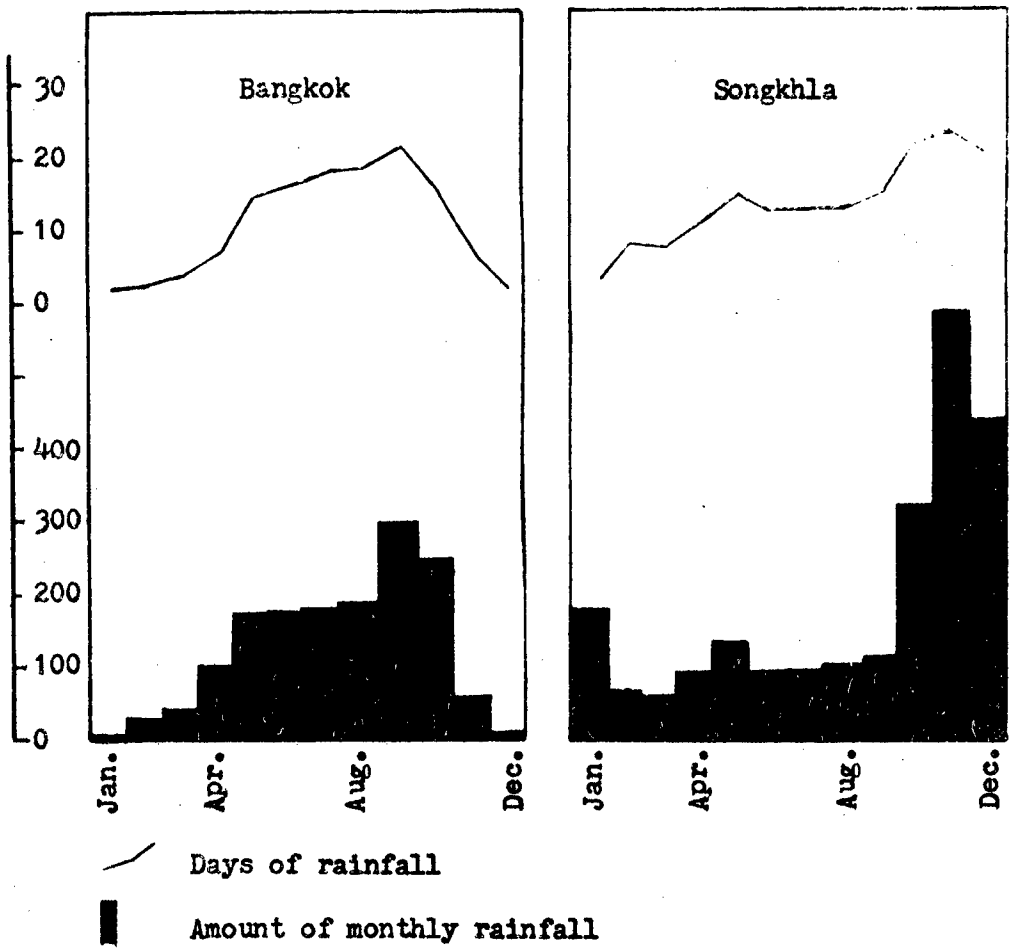
By the 26th of October 1962 at 0100 hours the storm had greatly increased in strength with a wind velocity around the center of up to 50 knots or 90 kilometers per hour.

On the 27th of October 1962 the cyclone passed over the southern region into the Gulf of Martaban, at a greatly reduced strength, and moved on west into the Bay of Bengal.

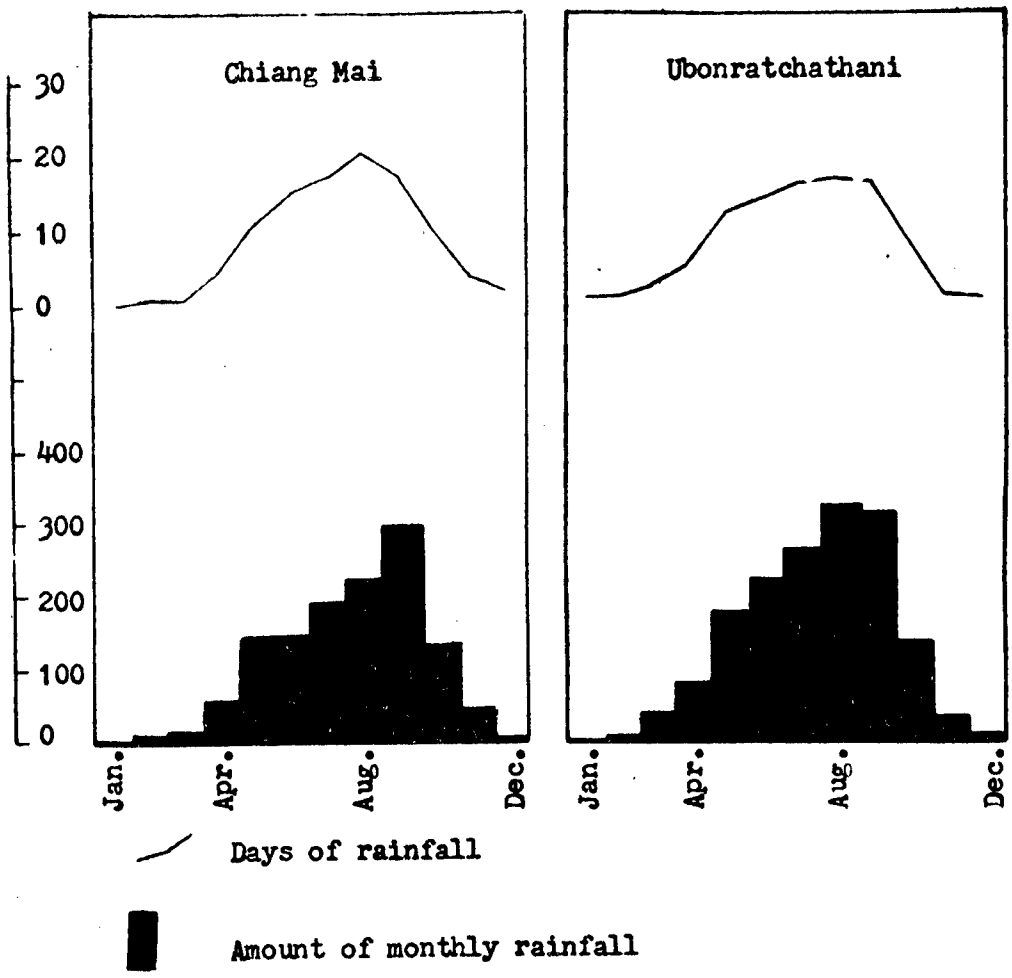
In Nakhonsrithammarat Province on the 24th of October there was 68.6 millimeters of rainfall and on the 25th of October there was 122.6 millimeters of rainfall.

This cyclone was very powerful and caused the greatest loss of lives and property in the history of Thailand. During the night and day of the 25th and 26th of October 1962 approximately 600 persons lost their lives and 40,000 buildings were destroyed. Total losses were estimated at 100,000,000 bahts.

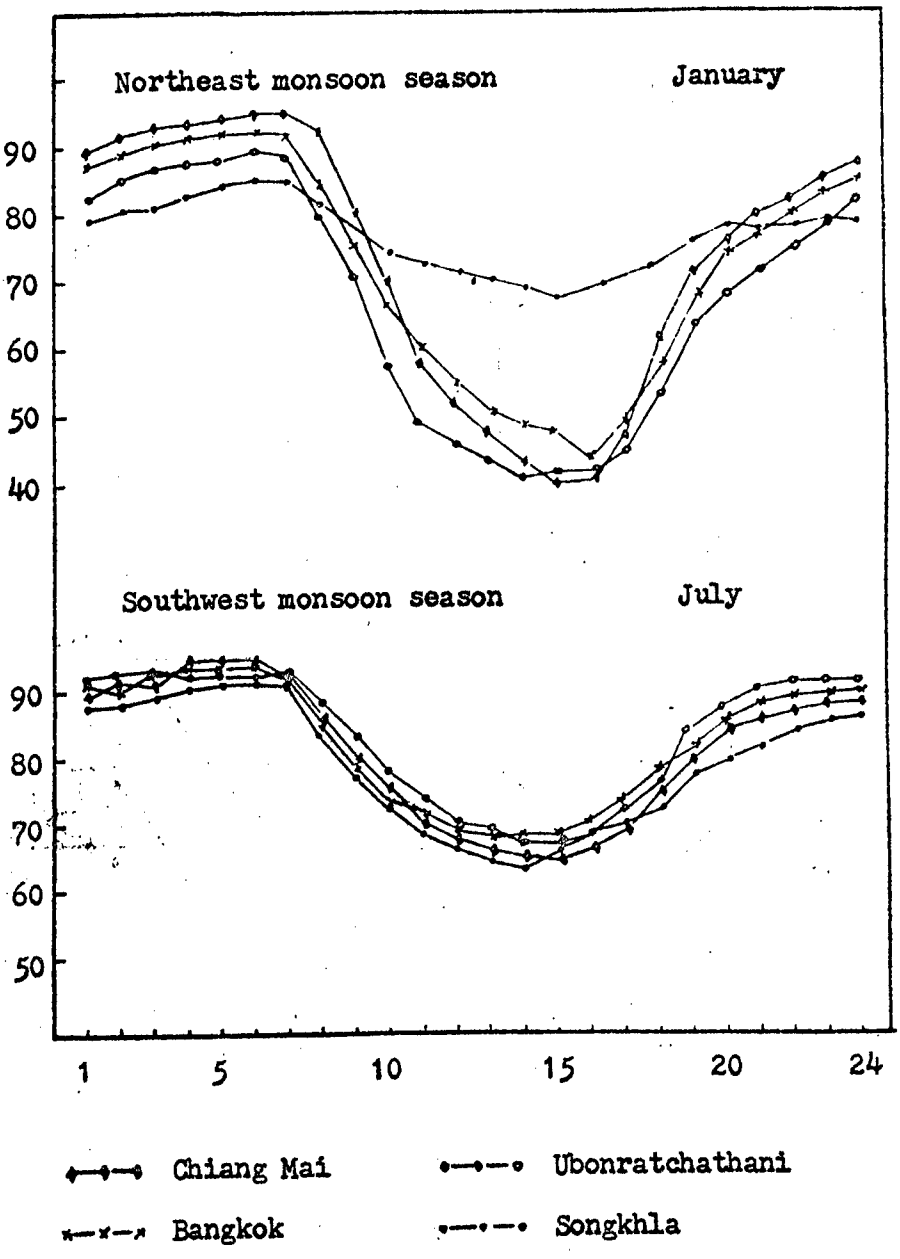
Amount of Monthly Rainfall and Number
of Days It Rains in the Various Provinces



Amount of Monthly Rainfall and Number
of Days It Rains in the Various Provinces

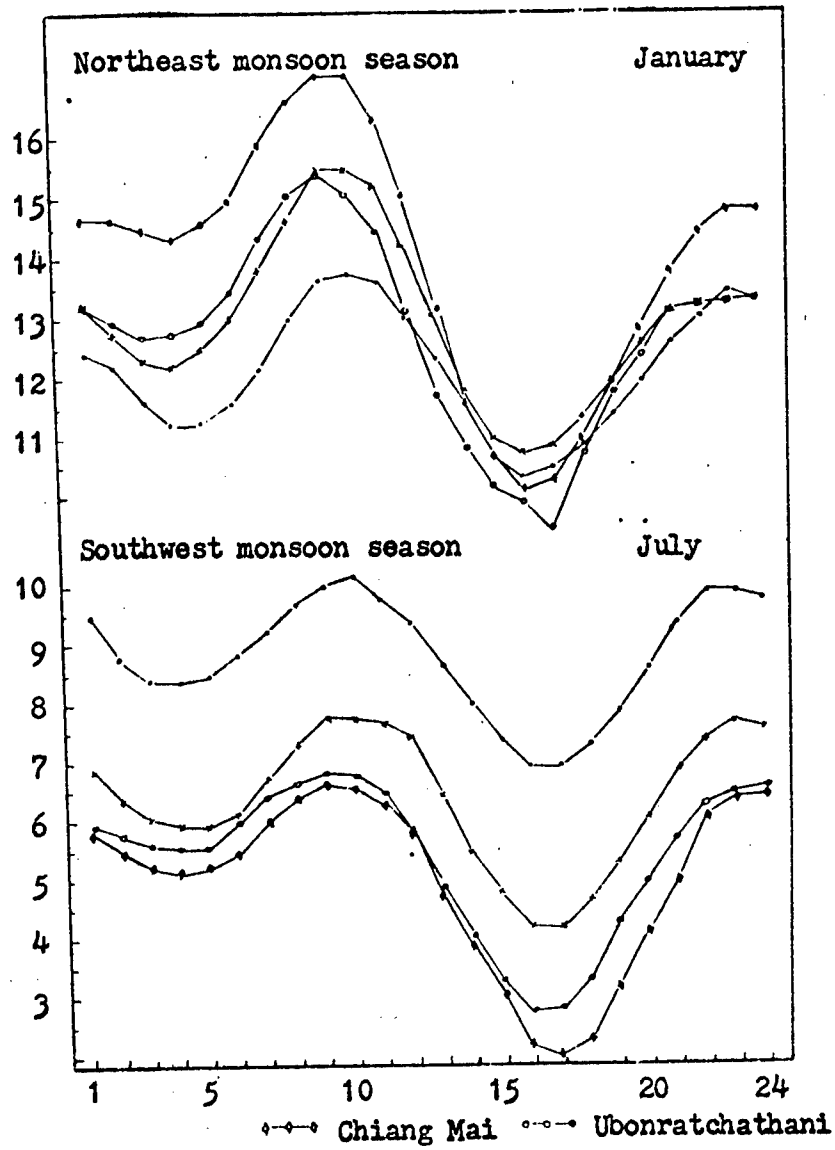


Variations in Daily Relative Humidity During the Monsoon Season for Various Provinces Representing the Regions

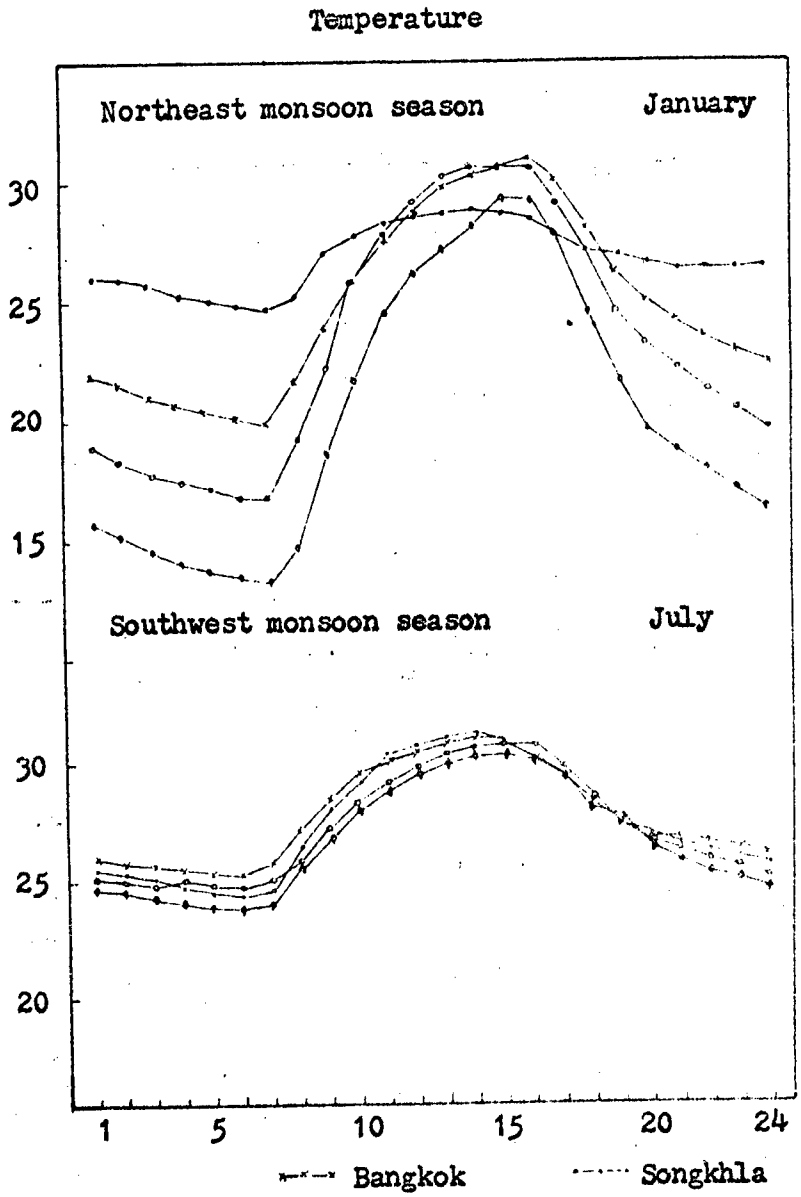


Variations in Daily Air Pressure and Temperature During the Monsoon Season for Various Provinces Representing the Regions

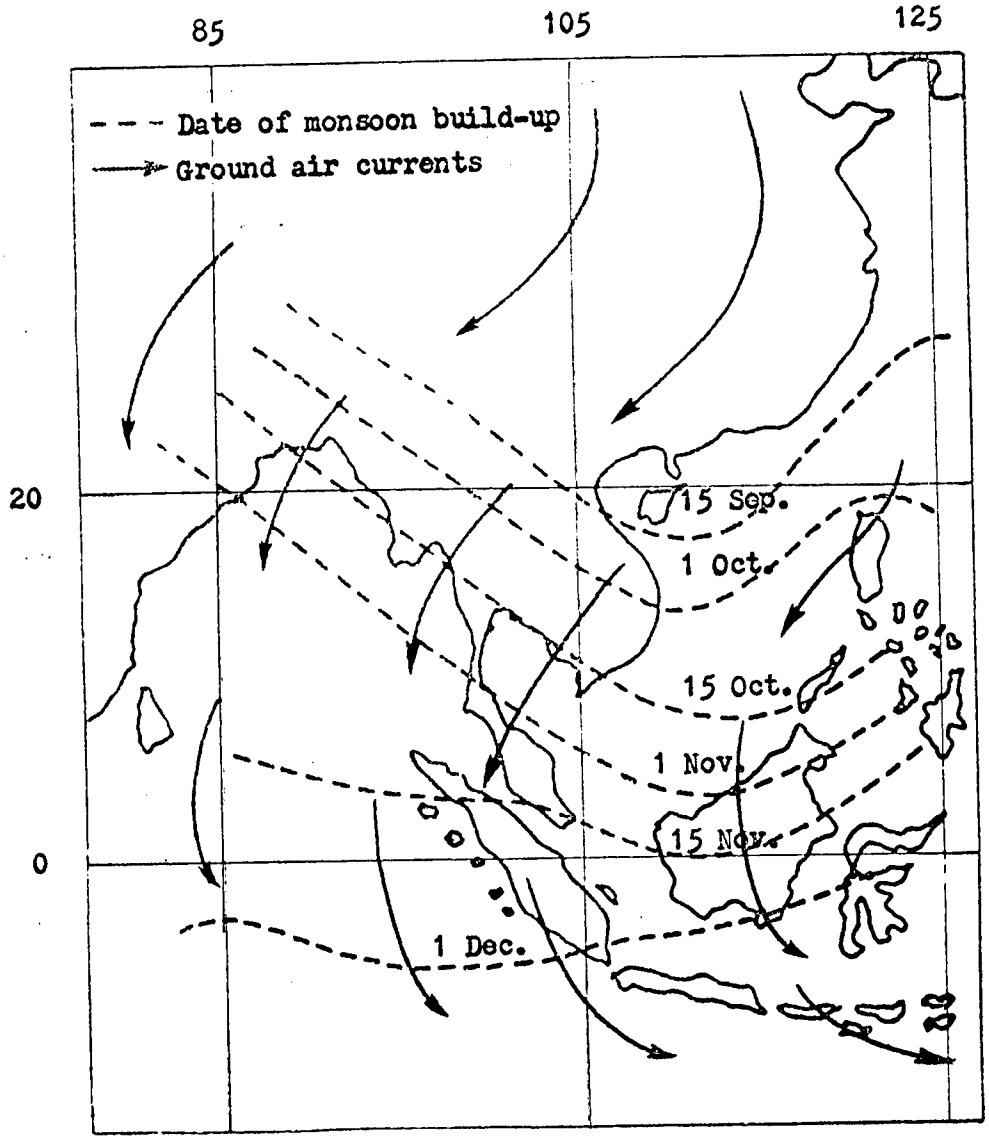
Air Pressure



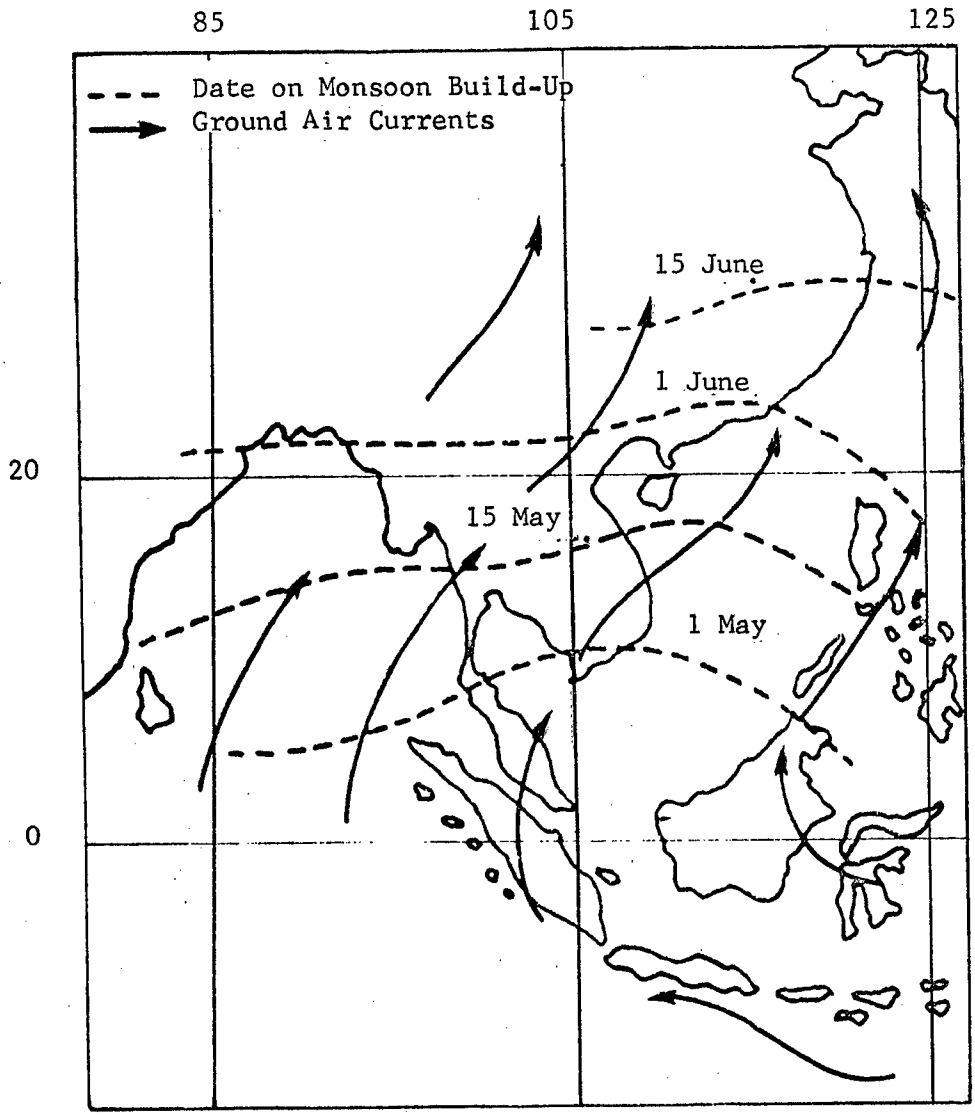
Variations in Daily Air Pressure and Temperature During the Monsoon Season for Various Provinces Representing the Regions



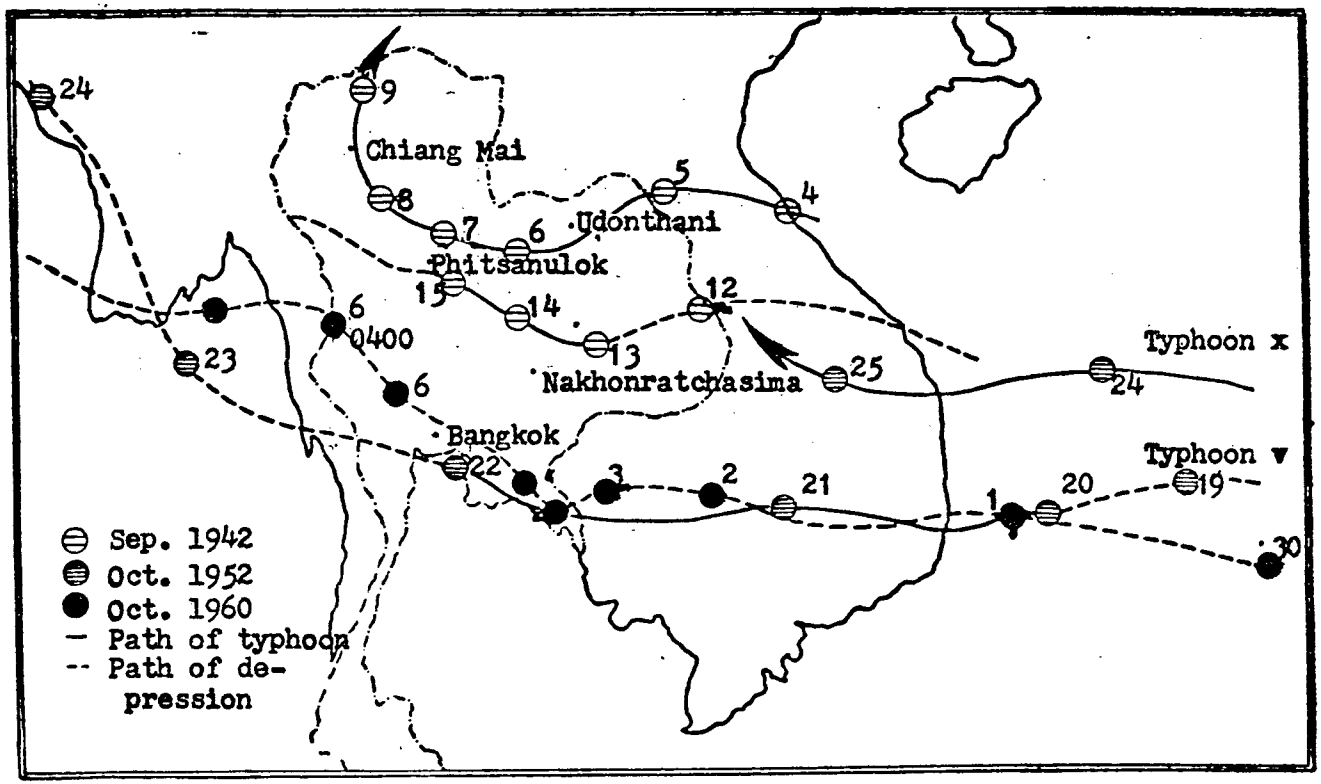
Map Showing the Beginning of the
Monsoon Build-Up



Northeast Monsoon



Southwest Monsoon



Routes Followed by Typhoons and Depressions Which Inflicted Losses on Thailand

(Based on 0700 Hour Reports)

CHAPTER 3

NATIVE FLORA

I. Local Varieties of Plant Life

Contemporary world geography defines the area which lies between the Tropic of Cancer, latitude 23°28' North, and the Tropic of Capricorn, latitude 23°30' South, as the Humid Tropics. It is an accepted fact that the various countries in this area possess the climate and fertility suitable for the flourishing of the plant kingdom. The many species of plants grow naturally into deep jungles of varied appearances.

Thailand, located between latitudes 5°37' North and 20°27' North and between longitudes 97°22' East and 105°32' West, is one of the countries of Southeast Asia within the Humid Tropics.

Thailand is situated in the central part of Southeast Asia, or as it is also called, Indochina (having derived this name from the fact that it lies between India and China), and covers an area of approximately 517,000 square kilometers. To the north it is bordered by Burma and Laos; to the east, Laos and Cambodia; to the south, the Gulf of Siam and Malaya; and to the west, Burma, the Andaman Sea and the Strait of Malacca.

The topography within Thailand is not uniform throughout the country; generally speaking however, it consists of low-lying plains with scattered mountain ranges, making it difficult to describe as an entity. The scattered mountain ranges are low, with the highest mountain being Mount Inthanon, in Chiangmai Province, with an altitude of approximately 2,595 meters. In the same province are also Mount Phahompogl, approximately 2,146 meters high; and Mount Luang Chiangdaw, approximately 2,185 meters. Mount Luang is located in Nakhorn Srithammarat Province and has an altitude of approximately 1,784 meters. Having considered the conditions within Thailand, it has generally been divided into the following regions.

A. The North and the West: These regions are covered by mountain forests and high plateaus which are the source of many of the streams and rivers

which are the source of many of the streams and rivers which flow through the Central region or wind their way to the Mekong River.

B. The Central Region: This consists mostly of a low-lying plain with many streams and rivers which continuously transport and deposit silt and mud.

C. The Northeast and the East: These regions are encircled by mountain ranges and consist of high plateaus with rolling hills and small mountains. There are prairies and arid forests scattered throughout these regions, but they have only two or three damp, tropical evergreen forests. The regions' streams and rivers do not carry enough silt and mud to maintain soil fertility in this wise area.

D. The Southeast: This region receives the monsoons which blow from both the Gulf of Siam and the South China Sea.

E. The South: This region receives the monsoons from two oceans and in this region the rainy season lasts the better part of the year. Vegetation grows in dense, deep jungles.

Since the topography, climate and surroundings of each region differ in the above mentioned ways, it is natural that the characteristics of the plant life in each region also differ. The South and Southeast have longer rainy seasons, damper weather and shorter dry seasons than the rest of the country; therefore the plants remain bright green all year long. The North and Northeast have both dry and rainy seasons; therefore the plants produce fruit seasonally, and in the dry season shed their leaves. It is interesting to note that the vegetation in all of these regions generally resembles that in neighboring countries. Upon closer comparison, however, it is found that it is more similar to vegetation in Laos, Vietnam and Cambodia than to Burma and Malaya; that is, it generally consists of deciduous forests.

The vegetation in the Central region, consisting mostly of wide, low-lying plains, differs from that of the other regions. This is a result of the large influx of people who engage in rice farming. The jungles which were in this region in previous times have been greatly reduced and have been replaced by other types of plant life brought in from other locales.

Besides these things, native plant life in the various regions differs in other respects. For example, some species of plants grow in the dry, rock and sand mixed soil of the mountains, while others grow in the damp jungles which have long rainy seasons; some grow in high cool places while others grow in low, stifling hot places; some grow in acidic soil while others grow in the salty water near the sea; some grow in stagnant water while yet others grow in the free-flowing streams.

Even though Thailand is a small country, but possessing rather good soil, because of the above mentioned characteristics it appears that plants

of almost every species are found there.

The study and survey of plant life in Thailand began in the year 2321 B.E. [1878] From 2321-2322 [1878-1897] Dr. Jean Gerard Koenig, a Danish national, first collected and surveyed Thai plant life for Botanical purposes. From that time up to the 25th Buddhish century [this began in 1957] there has been a continuous investigation of plant life in Thailand. Both Thai and foreign botanists have surveyed, collected and studied Thailand's plant life with increasing interest. There have been, for example, Dr. D. J. Schmidt, a Danish botanist, from 2443-2459 B.E. [1900-1914]; Dr. F. N. William, 2447-2449 B.E. [1904-1906]; Dr. C. H. Ostenfeld in 2448 [1905]; Dr. Hosseus, a German botanist, 2452-2453 B.E. [1909-1910]; and Dr. W. B. Craig in 2451 [1908] and on and on. When the Thai government established the Department of Forestry and the Department of Plant Species Investigation, foreign officials, especially Dr. A.F.G. Kerr, and Thai government employees in the Dept. of Medicine, Dept. of Forestry and the Dept. of Plant Species Investigation (the Botany Division, Office of Plant Species of the present) began the research which has continued to this very day. The results which have been derived, even though not yet complete, have greatly increased the knowledge of plant life in Thailand, especially concerning the varieties of flowering plants. These have received more attention than other varieties, but even what is known of these is but enough to be of significant use in further research. Thailand has at least 13,000 species of flowering plants, of which at least 30% are endemic.

When all the plant life in Thailand is divided into species according to international classification, it appears that all most every species of plant grows in Thailand. Some species have still not been studied. As for those species of which, through study and research, we have more knowledge, one of the most important is the phylum Thallophyta, a low form of plant life which can not be classified by stalk, root, blossom or leaf. It is almost impossible to say what its characteristics are, except that it is a plant which affects the well-being of man, animals and other plants. Within this phylum are the following:

1. Algae Of these there are both fresh and salt water varieties. All of its forms have not been studied. In some regions the populace gather and eat them, such as agar-agar and thawnam. Scientific knowledge will become available as the result of the research of foreign botanists.

2. Fungi It can almost be said concerning these plants that there is no one who has a great amount of knowledge of them, except perhaps those persons interested in them from a medical and psychological stand point and those interested in consuming them as a food, in which case, a knowledge of edible varieties is sufficient. Of interest are Volvaria esculenta, Auricularia and Termitomyces which are edible; Dictyophora phalloides which is poisonous and other species which are dangerous to man and plants; and those which have an industrial use.

The group of plants which result from the symbiosis of algae and

fungi are called lichen and are considered another class in the phylum Thallophyta. Those lichen found in Thailand are generally seen dwelling on cliffs, rocks and dead trees. There are probably quite a few species of lichen, but most have not been studied and therefore the number is unknown. There are two or three species which are well known, such as Usnea and Cladonia which people have used for medicinal purposes for many, many years.

3. Bryophyta This phylum is composed of plants similar to algae and fungi, but which appear to have improved themselves and to have taken on parts similar to land plants. They have a part which might be considered a stem, a leaf, and a root which has the function of sucking in food and retaining water in certain periods of its growth. It also has sexual reproduction in which the female organism is fertilized by male spores. These plants are divided into two groups:

a. Liverworts: These plants grow in damp, rocky-sandy soil and have flat stems which expand and grow together. The ends of these stems always divide to form two deeply serrated branches. There is no one who would dare try to confirm the number of its species.

b. Mosses: These plants vary greatly in appearance. Some types are very similar to algae, while some are quite similar to trees or bushes and have short leaves. Some species are thread-like in appearance, similar to senmi or green cotton thread. Research on this group of plants has also been conducted by foreigners.

Sphagnum, which is Sphagnum siamensis, is a moss which is quite similar to the Sphagnum which is found in Europe. The Sphagnum found in Thailand has an agricultural use, is used to absorb water, and is also used as a packing in containers.

4. Pteridophyta This phylum consists of the wide range of plants between the algae, fungi and mosses and the flowering plants. This phylum can be broken down into the following orders:

a. Equisetum The Horsetails
b. Selagenella
c. Lycopodium
d. The Ferns.

Ferns are one of the classes of the phylum Pteridophyta in which people have shown a great deal of interest and have done much research. Outstanding among these is Mr.Eryl Smith, the wife of Dr. Malcom Smith, royal physician during the reign of King Mongkut Rama IV. She collected and researched many of the ferns of Thailand. It is unfortunate that Mrs. Eryl Smith died before her findings appeared in print. The types of ferns found in Thailand are fairly well known because they grow throughout the country and because several species are useful in medicine, as a food or in floral arrangements, such as Cyathea, which grow in the mountain forests. Water ferns, such as Marselia crenata, Marselia quadrifolia Salvinia

cucullata and Azolla pinnata, grow in almost every watery spot. Some types grow on land or cling to trees or rocks, such as Cibotium barometz, Angiopteris evecta, Drynaria, Platycerium, Asplenium nidus and Lygodium.

Within the phylum Pteridophyta there are two other species which are considered rare. They are--

1. Ceratopteris thalictroides: These grow in almost every continent. There are three varieties, the first of which grows beneath the surface of the water or floats on the surface of clear water. This variety has no spores and reproduces by shoots which originate at its base or at its nodes. When small, these plants are attractive and people take them and place them is fish ponds. Another variety grows on land in very damp places. It has spores and is similar to the tonkhynchay, except that the leaves differ slightly as they are wide with a slight taper. The natives call this plant phagkudkwang.

2. Acrostichum aureum: These grow all over the beaches and shores of the Pacific. It is a fern which flourishes in damp places or in brackish water. They can be seen abundantly in the thickets of nipa palms and the pasem and pakongkang which grow along the sea coast. An underground portion of the stem grows in mud and it sends forth leaves similar to short palm leaves. The young leaves are red at the tip, but when the spores are produced, they appear as small, round golden seeds about the size of catfish eggs and they cover the top portion of the leaf. These spores are edible.

Plants in the phyla Bryophyta and Pteridophyta have an amphibious existence. That is to say, there is one portion of their existence in which they must live in water, this also refers to the extremely damp places in which these plants grow, and reproduction is carried on in this environment; and there is another portion of their existence which probably is on land and during which they can withstand a certain degree of dryness, depending on the individual species within these two phyla. The life of the plant in both these stages is related to the manner of reproduction of the species. Also of importance is that in the life cycle of various species in these two phyla there is an Alteration of Generation.

5. Spermatophyta This phylum contains flowering plants and has received more attention and has had more research than the other phylum because of its important relationship to the human race. This phylum is divided into two classes.

a. Gymnospermae: This group includes plants which produce seeds, but these are "naked" seeds which are usually on a scale within a bract. Plants in this class may be composed of male and female plants, or the same plant may produce both male and female blossoms. Plants of this latter type are found scattered throughout Thailand, but not in large numbers. Generally they flourish in the highest levels possible for them. Research has shown Thailand to possess the prong, which in some sections is called

the turtle coconut (cycad) of which there are approximately four to five species: Cycas siamensis which grows in dry forests, Cycas immersa which grows in damp areas and on mountain slopes, Cycas rumphii which grows on islands and along the coast, and Cycas circiralis which grows along the high mountains. In the deciduous forests there are various types of pine trees, such as the gia of which Thailand has two species: Tenasserium pine, Pinus merkusii, which grows in the mountains or island areas with an elevation of 180 meters up to 1,220 meters; and the three needled pine, Pinus Khasya, which grows at lower levels than the Tenasserium pine, i.e. 300-900 meters. In Thailand, however, it appears that these two pines grow mixed in the same area. Members of the populace bore holes in both these species in order to collect the pine rosin which they sell. The species Dacrydium elatum and Dephalotaxus griffithii are found growing in tropical evergreen forests on the mountain tops. The wide needle pines, Podocarpus wallichianus, Podocarpus neriifolia and Podocarpus imbricatus are found in the high mountains and deep jungles in every part of Thailand. Besides these, there is still a great many species of the class Gymnospermae which are good for lumber, such as the Cnetum which grows scattered throughout the country.

b. Angiospermae: This class includes the flowering plants which have seeds within a protective covering. They are divided into two subclasses:

1. double seed leaf plants - Dicotyledoneae and
2. single seed leaf plants - Monocotyledoneae.

There are in Thailand, as was mentioned earlier in the chapter, approximately 13,000 species in these two subclasses. Classified according to taxonomy there are genus, family, and order. In Thailand there are plants representing almost 300 families, genera and species in which there is an interest and desire for knowledge.

Within the Dicotyledoneae there are Magnoliaceae, Annonaceae, Nymphaeaceae, Dipterocarpaceae, Rutaceae, Leguminosae, Verbenaceae, Euphorbiaceae, Moraceae, etc.

Magnoliaceae includes Michelia alba, Michelia champace, jihub and Talauma candollei.

Michelia alba is a tree with fragrant white blossoms which open at dusk.

Michelia champaca is a true with fragrant yellowish-orange blossoms which open in early morning.

Jihub has two species:

1. Talauma mutabilis and
2. Magnolia coco.

Both species have fragrant white blossoms the size of a pigeon's egg

and which are petaled and open in the evening. Magnolia coco is not native but was introduced by foreigners.

Talauma condellei is one of the plants which is found in Southern Thailand. It has a fragrant, creamy-white blossom, but this blossom is not the same size as those cultivated near houses and in gardens. The cultivated magnolia has a blossom again the size of those which grow unattended in the forest. Besides this, Northern Thailand has another magnolia which grows in damp, cool areas. It is not of the genus Talauma, but rather is Manglietia garrettii and is native to Thailand.

Plants of the genus Annonaceae are also present in abundance and include plants native to Thailand and those which were introduced to Thailand but which now grow in such profusion in that it is difficult to distinguish them. There are:

1. Rauwenhoffia siamensis
2. Desmos cochinchinensis
3. Sphaerocoryne clavipes
4. Cananga odorata the ylang-ylang
5. Anona Squamosa - the sugar apple or sweet sop
6. Annona reticulata - the custard apple or Bullock's Heart.

In this genus there are large and small stemmed plants and creeping vines. The flowers have three petals in each of the blossoms' dual petal layers. These petals surround the stamen and pistil clustered in their center.

1. Nymphaeaceae: These consist of Ubolchati and Pathumchati which grow abundantly in the brooks, swamps and canals. Their blossoms are attractive. Ubolchati consists of the lotus and have petioles and fruit leaves. The blossoms and leaves float on the surface of the water and open during the day or night. Ratubol has red blossoms; sewotubol or the Egyptian lotus, Nymphae lotus, has white blossoms and Phyan lotus or Blue Lotus of India, Numphaea stellata, has purplish-blue blossoms and floats on the expanses of submerged fields and rice paddies.

Pathumchati consists of the Royal Pathum lotus which has red blossoms and the Royal Punthrit lotus which has white blossoms. The petals of both have no petioles. There are also the Royal Sadtabongkoch lotus which has red blossoms which do have petioles. Of these are the species Nelumbo nucifers which are day blooming, with the blossoms above the surface of the water.

2. Dipterocarpaceae: This consists of the rubber wood tree, Dipterocarpus alatus; the phajaum, Shorea talura; the maiteng, Shorea obtusa; and the mairang, Pentacme suavis var. siamensis. The plants in this genus are large trees whose unopened blossom petals are spiraled and when open are quite fragrant. Except for the rubber wood tree, they generally bloom profusely after shedding their leaves. Their "fruits" have "wings" which aid in

allowing them to fall far from the parent tree without any difficulty. These trees are scattered throughout the country and are most useful. They are used, for example, in the building of homes.

3. Rutaceae: These plants generally have sap-producing stems, leaves, flowers or fruits. This sap can be refined and used in various ways, including aiding in the curing of diseases. Some varieties are edible, such as the pomelo, Citrus grandis; the king orange, Citrus nobilis; the lime, Citrus qurantifolia; the bael fruit, Aegle marmelos; the lemon, Limonia acidissima; and the lime berry, Triphasia trifolia.

4. Leguminosae -- commonly called beans: These plants appear in numerous genera and species in Thailand. One can not give a single definition of their shape and characteristics. There are large-branched varieties such as Pterocarpus indicus; Wylia kerrii; and the rain tree, Samanea saman. Small plants include the Barbados Pride, Caesalpinia pulcherrima; Indigofera tinctoria and Sesbania roxburghii. Creeping varieties include the Rosary pea, Abrus precatorius; the butterfly pea, Clitorea ternatea; and the Malay jewel vine, Derris scandens. Annual and biennial plants include the peanut, Arachis hypogaea; the sensitive (or humble) plant, Mimosa pudica; and the black gram, Phasealus radiatus. Even water varieties, such as Neptunia oleracea, are found.

5. Verbenaceae: There are many plants in this family, including bushes, trees, creepers and biennials, such as Clerodendrum paniculatum and Clerodendrum fragrans; or Congea tomentosa; the purple wreath, Petrea volubilis; and teak, Tectona grandis. Teak grows in the deciduous forests of Northern Thailand.

6. Euphorbiaceae: This variety of plant produces male and female organisms in the same blossom. They usually have white juice and some varieties have edible fruit. Others are poisonous and still others have medicinal and industrial uses. There are many species of this family found in Thailand, some of which have world-wide significance, such as the cassava or tapioca plant, Manihot ultissima; the rubber tree, Hevea brasilieniss; Aleurites montana; the Otaheite gooseberry tree, Phyllanthus acidus; the Spurge, Euphorbia antiquorum and the salaud, Croton figlium.

7. Moraceae: The plants in this family are similar to those of the family Euphorbiacea except that the Moraceae produce male and female reproductive organisms in separate blossoms, which is different from the method of those plants mentioned previously. There are, for example, Artocarpus heterophyllus; the white mulberry, Morus alba, on which the silk worm feeds; Streblus asper; the Bo tree, Ficus religiosa; and the banyan, Ficus bengalensis.

In the Monocotyledoneae the important members are Orchidaceae and Gramineae.

8. Orchidaceae: This family contains the various species of bananas and is a fairly large family. In Thailand there are more than 1,500 species within it. All of these species have blossoms which are pleasant to the

eye. Some species which are popularly cultivated are Dendrobium chrysotoxum; Dendrobium aggregatum; Dendrobium thyrsiflorum; and Vanda doerulea, a lilac-blue flowered plant which grows best in cool, damp places. Because of the interest in these beautiful plants, some varieties have been brought in from other countries, such as the various Cattleyas.

Any of these plants which are found in Thailand can be found in the Description of Orchids by Bunnar Seidenfaden and Tim Smitnant.

9. Gramineae: This family of grasses has many genera and species. Many of these species are very useful to both man and beast. Plants in this family vary in size from tiny specks to large, strong plants. They grow in water and on land. There are, for example, rice, Oryza sativa, which is consumed by people in almost every part of the world; corn, Aea mays; Job's tears, Coix lachrymajobi; and sugar cane, Saccharum officinarum. This does not even include the numerous bamboo such as Dendrocalamus asper; Dendrocalamus giganteus; Thyrsostachys siamensis and common bamboo, Bambusa vulgaris.

The research of Dr. W. G. Craib, Dr. A. F. G. Kerr, and others has culminated in the publication of a book listing the species of plants found in Thailand. This book is entitled Florae Siamensis Enumeratio.

II. Native and Exotic Plants

As was mentioned earlier, at least 30% of the species of plant life in Thailand is native. The term "native" refers to any species of plant which grows naturally in any one country and is considered native to that country. In Thailand itself, the species of native plants are divided into two categories.

1. Those plants that appear only in Thailand and which are considered to have had their origin there are called endemic.

2. Those plants which also appear in other countries, indicating that they had their origin in various locales at the same time, but which grow naturally in Thailand are called indigenous.

3. Any species of plants which never appeared naturally in Thailand, but were imported from other countries and planted in Thailand are called exotic. Of these various exotic plants, some flourished, some were stunted and some died. Of those that flourished, some reproduced and spread rapidly, while others did not. This is because the climate in Thailand has the essentials which cause a great many species to mutate in order to grow in harmony with their surroundings. There are for example, sabsya, or as it is called in the North, Muangwai grass and in the Southeast, French grass and by Westerners, Thoroughwort, Eupatorium odorata; the Egyptian lotus, Nymphaea lotus; toiting, Ruellia tuberosa; the water hyacinth, and the humble plant, Mimosa pudica.

There are great numbers of exotic plants in Thailand, and the larger

the population becomes, the more convenient the communications become and the better international contact becomes; the larger these numbers become. How these exotic plants came to Thailand is difficult to say because there are many ways and means possible. Mankind seems to play an important role since we transplant them for our use. Some of these plants are ornamental; some have nutritional value; some are useful articles; and some have medicinal value. The search for exotic plants which will grow in Thailand has been going on since ancient times, and therefore it is not at all surprising to see them growing in every section of the country. Those that can not grow in one place may flourish in another and some types can grow anywhere and can live in places in which the climate, water and surroundings vary. Sometimes this mixture seems quite improbable, such as the peacock flower, or Royal poinciana, Delonix regia; the Barbados plant, Caesalpinia pulcherrima; the sugar apple, Annona squamosa; and the Rain tree which comes from Central America; Ruellia tuberosa and the coconut tree, Cocos nucifera, which come from the countries of South and Central America; and the pomegranate, Punica granatum which comes from the Mediterranean area.

Problems concerning both native and exotic plants occur unavoidably in almost every country, especially when the mass of humanity is the carrier of the problem. Importing valuable exotic plants is helpful to the economy, but sometimes unintended species of plants are imported on these very plants. These unwanted species spread and cause plant epidemics. For example, the red tobacco plant, Jatropha gossypifolia, is the carrier of Gomphrena celosoides, the Artillery plant, Pilea microphylla; and various other species of epidemic causing plants. When such plants are introduced into a country, they can only cause damage and efforts must be made to control and eradicate them.

III. Field, Orchard and Paddy Plants

Plants, whether native or exotic, are important because they help produce the necessities of life for animals and for men. Aside from this, they are also important natural resources in every country. They are especially important to countries in which the state of the economy is dependent on agriculture, as is the case in Thailand. Fruit plants which are good for consumption or as useful objects are truly helpful in improving the economy of the country. Therefore, plants which are known to be useful are planted in every province and section of the country. Naturally these native and exotic plants which have come naturally or have been introduced by man, have been planted continuously for thousands of years. There are rice, Oryza sativa; corn, Zea mays; Job's tears, Coiz lachryma-jobi; soy beans, Glycine max; pidgeon pea, Cauanus catjans, "green" pea, Paseodus radiatus; cow pea, Vigna sinensis; mulberry, Morus alba; surgar cane, Saccharum officinarum, bananas, Musa hybrids; mango, Magnifera indica; tobacco, Nicotiana tabacum; grataun, Sandoricum indicum; durian, Durio zebethinus; longan, Euphoria longana; nga, Nephelium lappaceum; langsad, Lansium domesticum; mangosteen; Garcinia mangostana; pumelo, Citrus grandis; giant orange,

Citrus nobilis; lime, Citrus aurantifolia; betel palm, Areca catechu; coconut palm, Cocos nucifera; Palmyra palm, Borassus flabellifer; black pepper, Piper nigrum; and many, many more.

The Thai people are adroit in growing rice. Rice farming is probably more important than other work because there is at least excess rice which can be sold and bring income to the country.

In agriculture and horticulture, the Thai people in the era of our ancestors saw the importance of the varieties of the various plants and practiced selection to such a degree that some learned man once said, "Thailand seems to be a center of horticultural flourishment".

In the long line of exotic plants which men have introduced into Thailand, the rubber tree, Hevea brasiliensis, must be considered of primary importance. Its origin was in the New World in the basin of the rivers which flow into the Amazon. The native tribes knew of its use for many years before the Europeans discovered it in Brazil and transplanted it in the various parts of the world in which they thought it would grow and produce. The result of this is that in Southeast Asia, where it was found most suitable for the growth of the rubber trees, it has become the most economically important plant in Malaya, Java and Thailand at this present time.

IV. Changing Plant Characteristics

When the population increases, inhabited areas also increase; more buildings and dwellings are built and the need for building materials and wooden utensils also increase. The quantity of roads and waterways used for communication and other purposes increases the material prosperity increases. The land which is used to make a living on increases and the forests decrease greatly.

For the most part, the occupations of the Thai people are in the field of agriculture, or if in commerce or industry, the raw material is usually one of the economically important crops. Economically important crops are widely disseminated and rapidly replace the former, natural species. It is this that causes the natural state, including the climate and many living organisms, to change. The various plants must also change in order to adjust to their new life. Therefore, the characteristics of the plants which live in harmony with nature and their surroundings must, generally speaking, also change. For this reason, the characteristics of plant life 50 years ago differs from those of the present.

The Characteristics of Plant Life in the Central Region. The basin of the Chao Phraya River, from its mouth northward, was in former times covered with dense jungles with many good sized trees which grow well in low-lying, damp areas. At present it has changed and is almost entirely an area of homes and cultivated fields of orchards and rice. The former species of plants are found only in small numbers in the areas of brackish water at the mouth of the river and along edges of the swamps. In the area

of the river's mouth are found plants which grow in very wet mud, such as the mangrove, Rhizophora, Ceriops, Xylocarpus, Avicennia officinalis, Bruguiera and Excoecaria agallocha. There are bushes, creeping plants and smaller plants such as Flagellaria indica, and Derris trifoliata. In some places plants of the marigold group are found growing among these plants. There are, for example, Wedelia biflora and Veronica eleagnifolia. Two species of gill plants are the white flowered Acanthus ebracteatus and the purple flowered Acanthus ilicifolius. Further north is found the Sonneratia acida, a plant with a unique root which has sprouts at the surface of the ground to procure air. Its bright green leaves are the home of the fireflies which flash their lights during the night. There are two species of the yellow blossomed pho tree: the trees in which the blossoms are tufted is the mahoe, Hibiscus tiliaceus, and the second in which the blossoms are not tufted is Thespesia populnea. Cebera odolam is a medium sized orange. Fipa fruticans is a species of palm which was presumably planted in hopes of obtaining fruit and which spread rapidly. Grasses and sedges are found in great numbers in this basin. There are Cyperus malaccensis, Cyperus tegetiformis, Cyperus rotundus, Eleocharis, Scirpus grossus. Cyperus rotundus is probably the most prevalent of this group. The grasses found in the rice fields include Sporolobus; Bermuda grass, Cynodon dactylon; wire grass, Eleusine indica; and along the canals are Leersia hexandra; Penicum repens; Echinochola colona; Oryza fatus; Phragmites; the giant reed, Arundo donax; Hymenachne myuros, whose inner part is used in various decorations; and Saccharum spontaneum. In some sections Coix aquatica is also found.

The large trees found on the edge of the fresh water areas are Salix tetrasperma; the coral tree, Erythina fusca; and the hog plum, Elaeocarpus madopetalus, which has a small, edible fruit. Along small canals and the edges of the rice fields grow an abundance of plants such as Monochoria vaginalis; Ottelia alismoides; Blyxa angustifolia; the Blue Lily of India, Nymphaea stellata; Nymphaea cyanea; the Egyptian lotus, Nymphaea lotus, which has various colors and which is not native to Thailand but which has been growing there for many years; and the red and white varieties of Nelumbo nucifera. In some localities the water snowflake produces its pure white blossom. There are various algae, such as the bladderwort, Utricularia flexuosa, which has pouches in which to trap its food and which seasonally produces pretty yellow blossoms; Hydrilla verticellata; the hornword, Ceratophyllum demersum, which grows in quiet water as do varieteis of water weed such as Lemna minor; and duck weed, Spirodela polyrrhiza and water lettuce, Pistia stratiotes. There are the ferns Salvinia cucullata and Azolla pinnata. The monkey flower, Mimulus orbiscularis, and Hygrorhiza aristata are found floating on the surface of the water.

Nevertheless, the major part of the basin area of the Central region has changed and is a working area containing rice fields or orchards and other areas which are heavily inhabited. The plants which grew naturally in this area have, for the most part, disappeared and exotic plants have been planted in their stead. Of the plants which formerly grew in this area, those that remain are close to weed flora which are a hindrance to the cultivated plants. The plants which have naturally replaced the former

plants are generally annual or biennial and are also weed flora. It can be deduced that the plant life of the Central region can be divided into the following two groups:

1. Cultivated plants and

2. Weed flora.

The present weed flora are becoming an important problem involved in agriculture and are a danger in that they reduce the quantity and quality of the crops. They are hard to destroy and necessitate greater and greater investment in farming. The study of weed flora, including the study of the growth of these weeds and methods of destroying or controlling them, is difficult in Thailand because the weed flora involved generally have the same characteristics and ways of life similar to the desired plants. If not this, the methods of destruction and control which probably would obtain good results would cause damage to other things. The use of chemicals in some countries obtains excellent results, but in Thailand, it could easily have bad results.

In former times, the field crops consisted of rice and hemp. At present the Chinese Waterchestnut Elocharis dulcis is widely grown, but in the fields and orchards there are grown vegetables and fruits. There are those containing only one type of plant and these in which there is a mixture of plants. For example, there are the areca nut, Areca catechu; the coconut, Cocos nucifera; the clove tree, Piper betel; Durian, Dario zebethinus; Mangosteen, Garcinia mangostana; the Sanderica tree, Sandoricum indicum, the litche tree, Litche chinensis; the longan, Eupharia longana; the rambutan, Nephelium lappaceum; the mango, Mangifera indica; the marian plum, Bouea burnanica; the Sapodilla, Achras sapota; the various citrus plants, the jackfruit, Artocarpus heterophillas; the bread fruit, Artocarpus altilis; the rose-apple, Eugenia javanica; Eugenia nalaccensis; the Guava, Peidium guajava; Various types of bananas, which are considered common things. Some areas have the Chinese jujube, Zizyphus jujuba and the carambola, Averrhoa carambola. Growing with these plants are the ivy gourd, Coccinia india; birdpepper, Capcium frutescens (peppers which are well known in Thailand are Khinu pepper and Khila pepper); Eggplant, Solanum melongena; various Legumes, Neptunia oleracea; the Water morning glory, Ipomoea aquatica and the primrose willow, fussieua repens are vegetables which float on the water and are considered very useful. There are also Sesbania grandiflora and Sesbania roxburghii.

Around the temples is another place to find interesting plants, However, these are, for the most part, plants which have been brought there from other locales, but appear healthy and natural as a result of the care they receive. Many of the plants are shade giving trees and give pleasure to the eye and heart of those who dwell within the temple. It is likely that there will be both exotic and native plants, such as the "rubber" tree Dipterocarpus alatus; Hopea odorata; Pterocarpus macrocarpus, which the Malayans formerly called Pterocarpus indicua; the Spanish Cherry, Mimusop elengi; the Bo tree, Ficus religrosa; the banyan tree, Ficus benjamina; the

rain tree, Samanea saman; the persimman, Diospyras pakmannii; and the night jasinine, Nyitanthes arbortristis.

The plant life found around homes in the Bangkok of today cannot be compared to that described in Thai epics. The modern Bangkok has at least 70% exotic plants and it is common to see localities overgrown with plants of central and South America. As far as can be seen there are the peacock flower or the royal poinciana, Delonix regia; Jacaninda filicifolia and Jaracunda mimosaefolia; the madre, Gliricidia sepium; Phyllocarpus septentrionalis; Brownea maculata; the Allamanda, Allamanda cathartica; Cryptostegia grandiflora; the Chinese trumpet creeper, Campsis chinensis; the coral vine, Antigonon leptopus; the Barbados pride, Caesalpinia pulcherrina; the clock vine, Thunbergia erecta; Mussaendalphilippica; Mucuna benettii and Strongylodon macrobotus. In the annuals and biennials there are /wild rice/ Zinnia Elegans, Dahlia, Chrysanthemum, Antirrhinum and Heppeastrum. The native plants found are the golden shower plant, Cassia fistula; the senna, Cassia bakeriana; the jointwood, Cassia nodosa; the Crape Myrtle, Lagerstroemia loudonii; the queen crape Myrtle, Lagerstroemia flos-reginae; Canangaodorata; Jasminun; the Orange jasmine, Murraya Paniculata; Michelia alba; Michelia champaca; Taluma mutabilis and Talauma candollei.

The planting of grass is an important factor in beautifying a yard and meticulous care is taken in choosing the right kind. The better known and more popular lawn grasses are Manila grass, Zoysta matrella; Korean lawn grass, Zoysia japonica; /flirting/ grass; Bermuda grass, Cynodon Dactylon and Polytrias ammura.

V. Characteristics of Plant Life in the Other Sections

In considering the characteristics of plant life in the other regions of the country, one must not only consider the natural changes and conditions of the surroundings, but also geography, topography, etc. The plant life of the other sections is more indicative of nature and its products than is that of the Central Region.

A. The North: The Northern region, lying between latitudes 17 - 20 North, is an area of intricately alternating mountain ranges which are the source of rivers and streams and there are thick forests scattered throughout this region. There are high plateaus in the mountain valleys, on the edge of the mountains and beside the streams. These valleys are the dwelling places for most of the population in this region. For the most part, this region has clearly defined seasons, a rainy season, a dry season and a cool season in which the temperature is as low as 5^{o}-25^{o} Centigrade. In the warmer, dry season the temperature ranges between 25^{o}-52^{o}C.

Because the topography and climate differ, the plants differ in their characteristics. That is to say, plants growing in a continually damp climate remain green all year along, while those growing in areas possessed of different seasons are green in the rainy season but when it is dry they shed their leaves and remain bare or almost dormant until the next rainy season

in which they produce new foliage. Plants growing in high places will differ from those which grow in the low areas at the foot of the mountains. Therefore, the characteristics of the plant life differs from the aforementioned Central region. But one must notice the characteristics or types of forest and the plants which grow in it. For example, in the tropical evergreen forests which are found on the rim of the water areas and deep valleys both the large trees and smaller plants are found growing together in profusion. There are plants such as the Eugenia; the Toog tree, Bischofia javanica; various species of Ficus; Cinnamomum; Talauma hodgesonnii; and Manglietia garrettii growing along with the wine palm, Caryota urens; the sugar palm, Arenga pinnata; and Pandunus. In higher areas are pine forests in which grow Pinus merkusii and Pinus Khasya; and also oak forests in which grow many species of aok. Besides this, in the very high areas are found subtropical plants such as the Phododendron; Ceratostigma, etc. Most of the forests in the North are, however, deciduous forests which in the more fertile high plateaus or valleys are actually mixed deciduous forests. In these latter grow the teak tree, Tectona grandis; Lagerstoemia calyculata; Lagerstroemia villosa; Dalbergia; Millettia brandisiana and Erythrina suberosa; Bauhinia racemosa, various species of bamboo and Leguminosae. Doscoria and Convolvulaceae also grow abundantly.

In some places the soil is not fertile because it is lateritic. The driest of these areas are colloquially called red, or goat, forests. There are few trees in these areas, and not many smaller plants. Upon close consideration are found Dpterocarpus obtusifolius; Dipterocarpus tuberculatus; Shorea obtusa; Pentacme suavis var. siamensis; Xylia kerrii; the golden shower plants, Cassia fistula; and Butea monosperma. Grass of the group Imperata cylindrica and other weed flora are also found interspersed in these areas.

The large population of this region is scattered throughout, even in the high altitude areas, and for the most part they make their living in agriculture. Therefore, the Chinese litchi, Litchi chinensis; the longan, Euphoria longana; the soy bean, Glycine max; tobacco, Nicotiana tabacum; tea, Thea assamica; and various other popular plants are widely planted. The mountain tribes are interested in planting opium, dry rice and corn, and in doing so destroy large areas of the high forests. This destruction causes erosion of the soil and slowly changes the natural state and characteristics of the plant life.

B. The Northeast: The topography of this region consists of a large wide plain and rolling hills which stretch to the Mekhong River. The central portion of this region is flooded during the rainy season, but becomes grassy meadows in the dry season. There are a few streams which flow from the north or west into the Mekhong. In general, the soil is mixed with sand and is laterite. This region receives about the same amount of rainfall as does the North, but because the soil has the above mentioned characteristics, it does not retain water or moisture and this causes a shortage of it during the dry season. As for the characteristics of the plant life, it resembles other fairly arid areas, that is, it has dry deciduous forests which are full of plants which can withstand the dryness. There are, for example, Dipterocarpus tuberculatus; Dipterocarpus obtusifolius; Shorea obtusa; Shorea talura; Pentacme suavis; Dialium cochinchinensis; Pterocarpus

parvifolius; Parinarium anamense; Butea monosperma; Senna; Cassia bakeriana; Cassia garrettiana; the golden shower plant, Cassia fistula; the embic or myrobalan palm, Phyllanthus emblica; and smaller sized plants, some of which grow in groves, some of which have thorns and some of which grow around the water's edge. There are evergreen forests in two or three places. These are close to the mountains which rim the water areas and contain large trees such as Dipterocarpus alatus; Dalbergia cochinchinensis; strychine, Strychnos nux-vomica; Dillenia and Pentophorum inerme.

C. The Southeast and South: These regions have a greater amount of rainfall than the other regions as they receive monsoons during almost the entire year. The temperature remains constant and the soil is somewhat better than in the other regions which have plants which generally grow in the tropical evergreen forests. The characteristics of the plant life in these two regions have changed little, as the plants which grow there have not changed. There are Sterculia; Garcinia; Meliaceae; Lauraceae; Euphorbiaceae; Sapindaceae, and Anacardiaceae.

Agricultural occupations include growing coconuts and various fruits such as the rambutan, mango, durian, orange and lansa. Rubber plantations and spice plantations which grow such spices as pepper, cardamom, clove, etc., are also widely found. Because there are still only a small population and large areas of virgin forests, these areas probably will expand their agriculture for many years to come.

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CHAPTER 4

NATIVE FAUNA

I. Shellfish

Although there are many varied types of salt-water, fresh-water and land-based shellfish in Thailand, as far as is known there are none that are different from the kinds found in countries bordering Thailand.

Salt-water mollusks that are found in abundance and have economic importance include the iridescent sea mussel (Mytilus) and the sea mussel (Modiola) which are found in all the costal waters and are used extensively for animal and human consumption. Of the mollusks referred to as the oyster in English, which is of the Ostrea genus, as far as is known there are at least two species that are edible. These occur in estuaries where fresh water flows into and mixes with the seawater, and they thrive and grow rapidly, sometimes to a large size. The Thai call this species "takrom".

There is only one family of cockle-shells (Arcidae) in Thailand, the group known as the Arca genus, which is split into approximately ten species.

There are at least two families of barnacles which are found everywhere, in salt-water, brackish water and fresh-water. Certain species are edible.

In addition to the bivalved mollusks mentioned above, there are many other families with species such as the wedge shell, sea cram, etc.

There are many species of the uni-valved mollusk, spiraled in form, some short and some long. The most familiar of these genera are the top shells (Trochus) and the turban shells (Turbo). These two genera are used in the making of ornamental objects. The turban shells, in particular, are sought for making ornamental containers such as ashtrays, etc. As for edible shellfish, there are the gastropods (Cerithidea).

Within the conch shell genus phylum there are two species, the small conch shell (Strombus) and the spiny conch shell (Bursa). There is no history of either of these species of the conch shells

being used for trumpets or for holding ceremonial water in rituals in Thailand.

In addition, there are the cowrie shells (Cypraea) and the pyramid shells (Pyramidella) so-called because of their spiralled, tapering, pointed shape similar to the rolled betel leaf, the murex (Murex), and the cone shell (Conus) which is sometimes called the goblet shell (from pictures of the ancient brass goblets). These shells are useful for making ornamental objects such as buttons, etc. There are the Brahmin topknot volute (Voluta), the areca-nut shell (Auricula) which is sometimes called the conch shell in some localities, and the worm shell which is edible and is roasted like the cuttle-fish.

Among the fresh-water bivalves there are about six genera of spathed shells, key shells and sand shells which are of the Unionidae family. These shells can be found in large numbers along some streams where the soil is sandy.

Of the fresh-water shellfish belonging to the Lymnaeidae family there are the fresh water shells of the Lymnaea genus and rod shells of the Planorbis genus.

Fresh-water shellfish, which are frequently found in the marshes and which belong to the snail family Ampullaridae, are all of the Pachylabra genus. There are about seven species of this genus. Of the univalves it is believed that the snails are the largest.

There is only one fresh-water univalve mollusk which is found in abundance and it falls into the Viviparidae family. This is the bitter shellfish which produces living young. There are at least four species which are found in Chiang Mai and Song Khla Provinces.

The shellfish of the Bulimulidae family attach themselves to trees and have varied features. The shell of these shellfish is thin and is phosphorescent. It can be found in anyplace suitable for their growth, both in the lowlands and in the mountains. In addition there are many genera of creeping snails of the Helicidae family.

Cuttle-fish, from a biological standpoint are placed in a subclass of the Cephalopoda class of the phylum because they have evolved from the shellfish. Cuttle-fish found in Thailand include the chain cuttle-fish, the shelled cuttle-fish, the orchid cuttle-fish, the onion cuttle-fish, etc. Because they are generally referred to as fish, but in fact are not fish, scientists have shortened the term to just cuttle so that they would not be confused with fish. Since it has not yet been publicized, from a scientific standpoint, as to the actual nature of cuttle and cuttle-fish, at this time the categorization of Thai cuttle or cuttle-fish into genera and species cannot be done with any degree of certainty.

II. Insects

It might be said that the Lipidoptere order of butterflies, which has been studied in Thailand in great detail, belong to the daytime phylum Rhopalocera, whereas the nighttime phylum Heterocera which is generally called "moth" in English has come under close study only quite recently. Approximately 700 species of the daytime butterflies in Thailand have been isolated, named and categorized to date. About 140 of these species are found in Pranakhorn and Thonburi Provinces. It has just come to light that there were persons who collected Thai butterflies as long ago as 1770; in this year Fabricius named one Thai butterfly "Clarome arcesilaus from Siam". It was the first specimen and apparently came from the vicinity of Chanthaburi Province; it is still kept in a British museum.

The study of butterflies generated great interest because (a) it demonstrated clearly the differences in wildlife found in the various sections of Thailand, (b) it demonstrated clearly that some phylum could adapt themselves to the seasonal climatic variations ranging from the monsoon to the dry season.

Butterflies often encountered in Bangkok include those called Papilio acacus which, because of their unusually large size, we call Giants (a daytime variety). They have antennae tips with nodes or antennae tips that are larger than the base of the antennae. As for the other butterflies, we refer to them all collectively as just butterflies. Both the male and the female Giants usually single out and gather the pollen from the blossoms of the flame tree (Delonix regia). When the flame tree first bursts into bloom with red blossoms that cover the tree, the male butterflies come en masse to the blossoms creating a sight that is beautiful to the eye.

In the jungles of Thailand can be found some of the most beautiful butterflies in the world. In the butterfly phylum one of the butterflies that has outstanding characteristics is the Kallima inachus which in English is commonly called the leaf butterfly because the underside of their wings is colored like leaves to protect them against their enemies by blending in well with the leaves of the trees. Biologists have been quite interested in them since Wallace (Alfred Russell Wallace 1822 - 1913) carried out his studies on the theory of the evolution of life with Darwin and others. These studies were carried out systematically (see the picture of this butterfly on the opposite page). In the picture of the two butterflies the two at the bottom are members of the same species. Number 3 is somewhat larger and lighter colored than number 2. They are found near the medicinal trees and are named Kallima inachus simensis Fruhst. Number 2 is smaller but is more vividly colored than number 3. They are found close to Chiang Mai and are named Kallima inachus limborgi Moore.

It has already been stated that the study of nighttime butterflies or "moths" is still far behind the study of the daytime butterflies. It is noteworthy that there have been some Westerners who have collected Thai nighttime butterflies at one time or another and have taken them for scientific categorization at the British Museum. It has been said that they were able to find up to 375 species of which 15 species were unique specimens. If 15 unique species were found out of the 375 collected it can be assumed that there are still many species of nighttime butterflies to be discovered in Thailand in the future. If notes are kept of all the finds of nighttime butterfly species the number could run into the thousands. In addition to those species collected by Westerners and sent to London an additional 200 species have been identified and 20 of these species were new biological specimens.

One more thing, in addition to the work of tabulating the names of the nighttime butterflies and the satisfaction that comes from noting new species, there is another aspect of this work which is always interesting. This is the research to discover the details of the lives of these butterflies, especially of the early stages of their development when it is believed they are a danger to the crops. The Agriculture Department has collected and tabulated information on these dangerous insects that has been printed in book form. The cereal crop that is important to us is rice and insects that are a danger to the rice plants include the early stages of the nighttime butterflies, the larvae which cuts and eats the vegetation. The larvae and caterpillars of the various nighttime butterflies that are important in this respect include the vegetable larvae (Prodenia litura), the rice seedling larvae (Spodoptera mauritia) and the Indra buffalo larvae (Cirphis unipuncta). During the planting season these larvae first come to life in the grass, the common vegetable gardens, and in the fields and are hard to get rid of. The Indra buffalo larvae can be seen at anytime in great abundance. They are worse in years of heavy flooding. This nighttime species of butterfly has an average length of 44 millimeters from wingtip to wingtip. They are light brick-clored or light tan. Some are spotted and some have brightly colored patterns. These boring larvae cause heavy losses to the rice plants which vary from year to year. These larvae come from nighttime butterflies and occur in greatest numbers during the planting seasons, that is during the months of September, October and the beginning of November.

While we are mentioning this subject, there is another species of small-sized nighttime butterflies which we commonly call the White Lace. At the larvae stage they are called clump larvae. They can be seen flying in swarms that resemble balls of fire. In the early evening they fly around the lights. Some of these butterflies stand out from the others because the front

of their wings is light brown in color with one small dark dot on each wing. The lower part of the wings is a glossy white similar to silk. There are stripes running along the edge of the wings close to the tail section. It measures about 12.5 millimeters. If you look closely you can distinguish another species of the White Lace that is smaller. The front portion of its wings is dark brown with small dots along the outer edge of the wings. These dots are very small, so small that they require a real effort to distinguish them. The lower portion of the wings is similar to the other White Lace butterflies as described above.

Both of these insect species, that is, the male and female White Lace butterflies that are named Schoenobius incertellus or the white clump larvae which are the rice borers, are commonly found on interior walls and room partitions. The White Lace, which swarm around lights, have small round clusters attached to them and covered with yellow hair. These clusters average about 16.25 millimeters in width and about 12.5 millimeters in length. These are the eggs of the butterfly which the female has deposited and secured in place. Over the egg clusters are fine hairs from the back section of the insect which serve to protect the eggs. These eggs can be eaten by ants, or if they survive the ants and develop into tiny larvae, it is possible that they will not live long because of a lack of food to nourish them or because they fall prey to tiny spiders.

It is too bad that the number of eggs of the White Lace butterfly, which are laid in one place and are of no danger at all to the rice plant, are such a small percent of the total laid. Most of the eggs are deposited on the grass or rice plants as both are ideal places which afford the eggs a refuge from danger until they develop into tiny larvae. In about two weeks these tiny larvae, dark brown or black in color with heads that are enormous compared to the rest of their body, are carried by the wind for considerable distances. As they are already in the larvae stage they immediately start eating the leaves of the grass and the rice plants and soon work down to the stock of the plant. In no time they have bored into the very heart of the plant where they remain quite comfortably. There they partake of the nourishment of the grass or rice plant as these juices pass from the base to the top of the plant. Sometimes one grass or rice plant will support as many as 10 to 12 of these larvae but when the larvae mature they demand an ever-increasing amount of the plant's nourishment. Finally enough of the larvae are forced to seek nourishment elsewhere so that by the time the larvae are completely matured there is only one larva per plant. At this stage the larva are approximately two centimeters long and three millimeters across. The color varies from dull white to a light yellow which blends with the green leaves of the plant. The head section is yellow or dark brown. Along the body

are hairs that are thinly diffused. If you carefully open the plant and look, you can see where the larva has concealed itself and see how it is stealthily destroying the plant. If there is sufficient nourishment for the larva it will eat continuously for several weeks. Finally, it will enter the chrysalis stage with a hard shell and features only roughly similar to its former self. The larvae at this stage first are rather whitish in color but they soon turn darker until they are brown; finally they turn reddish-brown in color. After eight to 14 days they have developed nearly to the point where they are nocturnal butterflies. They then break their shells and leave the grass or rice plant into which they had bored when they were larvae. It's almost as if they know in advance if their environment is not suitable for their growth, for they will not eat anything for many weeks, then they will finally select a suitable plant after two or three tries and will enter it where they will stay until they develop into a chrysalis and then into a nocturnal butterfly in that order.

If you go into the field at rice-harvest time, you will notice some places where the rice is badly bored. Instead of seeing bright yellow like the gold that is beat into rings, you see rice here and there that is pallid and its seed is undeveloped. This is the result of the boring and destruction of this insect. If you observe very closely it will be apparent that the rice plant is stunted and the tips of the leaves are dead. This rice is withered and dwarfed and will eventually die.

In the phylum of rice borers, in addition to those mentioned above, there are two more species, the Sesamia inferens (pink larvae) and Diatrea sp. but these two species have a natural enemy in an animal parasite which takes as its nourishment the blood from other animals. This is a small insect that in English is called the chalcid fly. In October 1929 a collector discovered that these parasites were 90% effective in destroying these two species of larvae.

In the phylum of nighttime butterflies that catch the eye there is the Giant butterfly (Attacus atlas). Its wings are reddish-brown but the wings have some parts that are transparent like windows. The caterpillar of this butterfly is very gluttonous and can be very dangerous to trees, especially those trees that shed their leaves yearly and fruit bearing trees because these butterflies can destroy them very quickly.

A species of nighttime butterflies found in great numbers is that species which in English is called the Hawk moth because of their fast flight. The Giant butterflies fly slower than the Hawk. One species in particular in this group, the oleander hawk-moths (Deilephila nerii), has wings that are green like the leaves of the tree and brown. They have especially beautiful features.

The dragon-fly flies in swarms in Bangkok and other places

and some phylum are very large sized. In Thailand there are hundreds of species of this insect of which 82 species have been isolated and named. Five of these species is unique to Thailand.

Bi-winged insects (Diptera), of which the fly and mosquito are examples, are numerous but the mosquito, especially, is found universally in great numbers. The mosquitoes which stand out above the others are those that seek human blood. These are in the Anopheles genus of where there are 16 species in Thailand. Some species carry disease germs to humans. The mosquitoes that are annoying during the day are the striped mosquitoes which are very hard to control because they are very small and can fly quite fast. The study of bi-winged insects is generally much more interesting than the study of daytime butterflies. Some collectors from the British Museum twice came and collected about 100 species of mosquitoes ranging to the very smallest. Of this number about 20 were new species.

There are also many grasshoppers (Orthoptera); you find them everywhere. Everywhere you walk they jump up and fly ahead of you. Grasshoppers with short antennae are much more common than the variety with the long antennae. In the paddy fields, in addition to the grasshoppers that are so common, there are two other species that are frequently encountered. They are in the sub-class Tryhalinae and Pyrgomorphinae and have rather small tapered bodies with flat snouts and antennae. Most of these grasshoppers can swim on the surface of the water for short distances. There is a new species of mosquito which Uvarov found at Rangsit Canal and named Quilta oryzae. It has flat back legs showing that it has adapted to swimming. The species with the long antennae (Locustidae) are hard to find but usually can be found in the jungle. There are also some of the grasshoppers with large rear wings very similar to a leaf that are called katydids in English.

Cockroaches (Blattidae) can be found hidden in the corners of buildings or they can be found in drawers or under sheets of paper. They usually come out only at night. However, some species exist outdoors and will fly about in bright daylight. Some species don't have wings and can be found concealed in the barks of trees. They usually are a conspicuous brown color but some species are completely black and some species brown with black and yellow interspersed.

The rice-threshing grasshopper (Mantidae) are sometimes called rice-husking grasshoppers because their front legs move up and down similar to the rice-husking motion. They are called praying mantis in English because its front legs are held in a position similar to a person raising and lowing his arms in prayer. Actually this grasshopper is not good-hearted in any sense of the word; the rising and falling motion of his legs is intended only to catch unsuspecting insects for food. The praying mantis could be called a tiger among the insects because

whatever they catch they devour completely. They have large eyes which move back and forth like they are constantly on guard. Their shape and color camouflage them well. Their wings look like tree leaves. In Thailand there is one species of this insect that is not longer than 1.25 centimeters, but the larger ones are much more prevalent. Some specimens of the larger species have been found measuring as much as 15 centimeters.

There is another species of grasshopper which looks like a stick. If you don't look closely you would think it was certainly a small branch or twig. In English these are called stick insects. They are grasshoppers in the Phasmidae family and can be found anywhere but especially in the woods.

The beetles (Gryllotalpa africana) which are called mole-crickets in English, usually come out of their holes at night and fly into buildings. They can dart from place to place very quickly. They try to squeeze into and under clothing and rugs. They have soft bodies and their front legs are very strong. They use these legs for clearing obstacles from their paths.

The hard-winged insects (Coleoptera) or beetles as they are called in English are commonly called grubs. There are some species like beetles and some species like the ladybugs. There are many, many species that range in size from very tiny up to very large with fearsome features such as a single rhinocerous-like horn that protrudes from the front of the insect's head, as is the case with the rhinoceros beetle or stag beetle. To date scientific investigation of hard-winged beetles has failed to find more than 200 species of beetles in the Carabidae family. One of these species which is quite common is the tiger beetle which is bright silver and tree-leaf green. Some species have yellow and red spots along the back of the wings. One species of the tiger beetle (Cicindela sexpunctata) is said, in India, to like to devour the rice bug (Leptocorisa sp.) which can be very destructive to the rice plants. Another species of beetle is the stink-bug (Pherosophus sp.) which varies in color from burnt brown to black. This species likes to fly about at night, can dart about very fast, and is clever. If you try to catch or touch them, no matter how small they are, they will emit a poisonous liquid with a loud accompanying noise. This emission is foul-smelling and can smart and burn. A beetle that looks awkward is the rhinoceros beetle which has a horn that is sometimes wider than the body. It has a double protuberance at the front of the horn. The lower part of the beetle is covered with light brown shaggy hair. They like to fly toward sources of light at night. Once they dart into a wall or partition they fall down with a loud crashing sound and then right themselves immediately by using their feet to grasp anything nearby. This beetle species causes great damage to coconut palms and sugar palms because they bore into the trees to lay their eggs from whence hatch the weevils. Beetles in the buprestid-metallic

wood-borer group which are beautifully colored, especially the large species (Sternocera Equisignata) which attain lengths up to 3.75 centimeters and have brilliant green wings, appear to change color from green to red when exposed to sunlight. They can be found almost anywhere. The Chinese use the wings of these insects to make ornamental clasps. Some people catch the young of these beetles and sell them. Purchasers keep them in cages or glass bottles for decorations and feed them tamarind leaves.

Of the group of hard-winged insects which are called tortoise beetles (Cassidinae) in English, they can be found eating the leaves of various trees. Some species are bright gold and green colored. When this insect dies the colors of its wings fade but they can be brought back somewhat if they are steeped in pure water for a time. The vari-colored tortoise insects that are called lady birds (Coccinelidae) in English are found in abundance everywhere. They are insects that are beneficial to man because they destroy other insects that are dangerous to some food plants. These tortoise beetles vary in size from very small to a full inch. Most have red wings and some have black spots. There are yet many species of long haired beetles of various sizes than, when they are captured, make an audible noise. One species in particular is the Aristobia approximator which is called the tufted-haired tortoise bug or the tufted haired beetle. It is pleasing to the eye because its wings are black with patches or spots of gold all over, that are not always uniform. It has long yellow hairs the ends of which have black tufts. It has some likeness to the firefly (Lampyrinae) which is also in the tortoise bug group and can be seen twinkling at nighttime, usually around the lamphu trees.

Insects in the Hymenoptera order include the bees, wasps, hornets and ants which are found everywhere. Species such as the ichneumon and the chalcid are very important insects because they help to control other insects which are destructive to the rice plants and various crops that are economically important. The mud wasps build nests along the cracks and corners of buildings and they like to take mud to plug up the openings of their nests where their young are. The mud wasp is a useful insect because it controls the butterfly larvae. It stings the larvae of the butterfly into a stupor and then takes them to its nest for food for its young. The bodies of the wasp family Chrysidae are green or silver like the color of metal. The wings are grey. The activities of this insect family are very interesting. They fly around looking for a mud nest that is satisfactory for raising its young. When they find one that is suitable they take the egg-laying protuberance at their rear end and insert it into the earth and lay the eggs in that nest. When the eggs hatch into larvae these wasps steal the nest from the previous owners and use it only for themselves. The carpenter beetle is in this family and it can be seen looking for food around flowers or

around posts looking for a place to bore a hole for its nest.

Insects in the Hemiptera order include the small green-bodied insects that like to cavort around electric lights and the giant electric-light bug (Lethocerus idicus) which some people eat because they have a pungent smell. There is also the cicada (yellow striped), singing cicada (larger than the cicada and burnt brown in color) and the widow cicada which sing together with varying sounds.

Collectors of the plant-lice group in the Thysanoptera order have found 22 species, 11 of which were new specimens.

There are still some species of animals, that fall into the insect group, which should be mentioned. These are the Paripatus group, which look similar to worms and are usually found along the mountains of Southern Thailand, and the centipede group which fall into the Myriapoda order. There are many species of these groups, but a thorough enough research has not yet been carried out to determine just how many species there are.

The spider and the mygale are creatures that also belong to these groups of insects.

III. Shrimp - Crabs

Thai waters abound with shrimp and fish, but these water creatures, except for the crabs, still have attracted very little interest from researchers. There has been very little categorizing of water creatures in the Copepoda, Amphipoda and Isopoda phylum which are important food sources for the larger creatures such as fish, etc.

Of the water creatures that have economic importance, there is the shrimp of which there are many species. In the Peneus genus there are the spraying shrimp, rare-eyed shrimp, white shrimp, hard shrimp and flowered shrimp. In the Penaeopsis genus there are the yellow-egged shrimp, yellow shrimp, delta shrimp, white-eyed shrimp, black-skinned shrimp, cantankerous shrimp and the fat shrimp. In the Parapaenopsis genus there are the holed shrimp, striped shrimp, and the grove shrimp. In the Acetes genus there is the prawn shrimp. In the Leucifer genus there is the reverse-egged shrimp. In the Crangon genus there are the kicking shrimp, the hard-picking shrimp, the shooting shrimp, etc. The inland waters and lakes of Songkhla Province are renowned for the varieties and quantities of shrimp found there. In the various waterways there are also spiny-clawed shrimp, smooth-clawed shrimp and dame shrimp which fall into the Macrobrachium genus. These are all large sized, long-legged shrimp and include many species, some up to 25 centimeters long.

There are many species and varieties of crabs. In the salt water can be found swimming crabs and many other species of sea crabs in the Cancridae and Portunidae (swimming crab and sea

crab) and sea crab (Scylla serrata) families which are considered to be very important. Along the streams there is also a group of crabs that is very interesting that belong to the fresh water family Potamonidae of which as many as 12 species are known in the various localities. Along the seashore and banks there are also land crabs of the Ocypodidae family, hermit crabs of the Paguridae family, and crabs of other families including large-sized crabs.

There are about eight species of mantis-shrimp of the Stomatopoda order. In the Chloridella or Squilla species some have beautiful coloring and go up to 30 centimeters in length. Some are equal in size to the large-sized shrimp. These mantis-shrimp usually are netted along the seashore and can often be found on sale in the open-air markets.

The parasitic or salt-water barnacle group in the Cirripedia order are found in large numbers; the Balanus barnacle and the Lepas parasite, etc. cling to the rocks and posts. There is a species of barnacles which bore into boat bottoms, wooden posts and anything else made of wood that is submerged in the water. We call this barnacle the clinging barnacle.

The king crab of the Xiphosura order has many varieties found all over the world. In Thailand there are two species, the Tachypleus gigas which are called locally dish king crabs or simply king crabs, can be found almost anywhere along the seashore of the Gulf of Siam and their meat and eggs are delicious; and the species Corpius rotundicanda which goes by various local names such as fire crab, cup crab, and dragon. The meat of this species is sometimes poisonous and it is said that even eating the eggs can sometimes be deadly.

IV. Fish

Fish are abundant along the coasts of Thailand. Some species fall into the tropical class of fish which is the best and brings a good price. Some species move about for long distances and it is not known just where their normal place of habitat is. During the course of a year these fish will swim into the territorial waters of many countries. Some species, on the other hand, will swim into one particular area all the time. This in some way is connected to the monsoon season. Some species stay along the seacoast and don't stray far, and it is upon these fish that the fishermen depend for a living. The Gulf of Siam is quite shallow so that there is plenty of food available for fish. These fish depend upon the plant and animal microorganisms, called plankton, that drift about in the water for food. These microorganisms are found in abundancy in the Gulf and the western shore territorial waters. There are many, many different species, therefore there are plenty of fish to be found in these areas.

With regard to the forms and living characteristics of these fish that seek vegetation for their development, it is apparent that conditions are ideal in Thailand for these phylum of shallow-water fish and the growth of this vegetation supports many genera and species of fish. For this reason there are an astonishing number of economically valuable varieties of fish. Some are especially delicious and can compare favorably with tropical fish found anywhere. Since Thailand has climatic conditions whereby it is generally dry for long periods of time with the accompanying shortage of water, these fish must take a form than enables them to cope with this type of climate.

The phylum of soft-boned fish (Elasmobranch) is abundant in Thai waters. There are still many species of these fish, both the rare ones and the common ones, that still remain to be categorized. This phylum is divided into categories of which the shark is one and the ray and sawfish are another.

Many species of sharks in the Galeidae family come into the waters of Thailand often and some of these species are quite large but some species at full maturity measure only 20 centimeters long. There are also some large speckled ferocious-looking sharks in the Galeocerdo genus that are well known to fishermen in the Gulf of Siam but they have still not been researched sufficiently to be certain just what species of shark they are. Sharks in the Sphyrnidae family have peculiar features; the head extends out from the body like a hammer. Sometimes it is called the small-eared fish. These hammerhead sharks grow to large sizes also, and they have many young. Two species of these sharks can be caught in Thai waters. Only one species of the whale shark (Rhineodon) is caught in Thai waters; it is a shark of the Rhineodontidae family which is abundant in the Indian Ocean. Those that became vagabond sharks and strayed to the Pacific and Atlantic Oceans not only are large, but are the largest of this group of fish. For this reason they are called whale sharks. The longest ever caught is reportedly one caught in the eastern part of the Gulf of Siam which measured 20 meters long. Sharks in the Orectolobidae family that are found in Thai waters include the tiger shark which is named Stegostoma tigrinum which is two meters long, and two species of the small speckled shark. There are also species of the Chiloscyllium genus as well as many other species. These species can all be found in the Indian Ocean and in Indonesian waters.

Rays belonging to various families are plentiful in Thai waters. That is, there are some rays called ant fish, burrowing fish, and swollen fish which are rays of the Rhinobatidae family that are called beaked rays in English, and many other species which are still to be enumerated. Electric rays (Torpedinidae) which are found in the territorial waters of tropical countries are smaller than those found in northern waters. One that is well-known in Thailand is the species Narke dipterygia which at

maturity is not longer than 20 centimeters. A larger species found around Trang Province is called the smarting fish (Narcine indica). The long-tailed ray is locally called the stabbing ray (Dasyatidae) because there is a barb at the tail which can tilt up and stab and there are many species of this ray. The bird ray (Myliobatidae) is called in some localities the bat ray; its head is extended from its body and it has a long tail similar to a whip which has a barb that serves as a defensive weapon. Its body is wider than it is long. The species that is commonly found is the Aetobatus narinari. Another species, in the Rhinopteridae family, is the ray Rhinoptera javanica which is called in English the bull-nosed ray. In addition to these, there is the giant ray which is called the sea-devil or devil-ray in English. It is in the genus Mobula and its head has a long protuberance similar to the horn of an animal. It can range up to six meters or more in width.

The saw-fish (Pristidae) has special features; a long flat bone protrudes out from the upper portion of its mouth on both sides of which are sharp teeth that look like saw-teeth. It is found in the coastal sea channel and various estuaries in Thailand. Some are six to eight meters long or even longer. They are the most feared of the sea creatures because they can use their sharp saw-teeth to terribly mutilate a person. A story is told of a person in India who was swimming in the sea when he was struck by a saw-fish and cut in half. The saw-fishes can be divided into various species by the number of saw-teeth, the shape of the saw, back fins, tail fins, etc. One species named Pristis perrotteti and another species named Pristis cuspidatus are found throughout Thai waters. A third species might be added to these, also. These fish can be hooked or netted and are sold in the marketplace. The meat is edible and some people like to eat the fins which they say are better than shark fins. In some of the pagoda close to the sea the saw-teeth are kept as sacred objects.

The phylum of scaleless fishes (Siluroid or cat-fishes) includes many genera and species. There are great differences in shape, size and habits of these fishes. In Thailand there are eight families that can be divided into more than 10 genera which can in turn be divided into over 80 species. Scaleless fish in the Clariidae family include the ca -fish group which has a long bottom fin, boneless back fin, four pair of whiskers, and organs for breathing through the gills. Fresh-water fishes in the Clarias genus include six species. There are in the Ciluridae family about 15 species of sheat fishes including six genera. This family also includes such common fish as the cat-fish, black cat-fish, sheat fish, Wallagonia, fresh-water cat-fish, twisted fish (Ompok), salumpon, short-face fish (Kryptopterus), red fish, silver fish, mirror fish, curved fish (about eight species) as well as the rarer sheat fishes (Silurodes). The family of marine

cat-fishes (Plotosidae), which has a short barbed fin in front and a second back-fin that is as long as the bottom-fin with both back-fins combining into the tail-tin, are fishes found near the seashores. There are three species. the sea cat-fish (Plotosus canius) the glass hook fish and the three glasses fish (Plotosus anguillaris). There are about 13 species of the Pangasiidae family which includes the biggest and best tasting fish of the scaleless varieties found in Thailand. In the Pangasius genus there are ten species including the mango fish, cat-fish, sangkawad, aidong, large-bottomed sangkawad, taro hasp, carp, sangkawad carp, white sangkawad, sangkawang, yellow sangkawang. These, along with the Hehiophagus genus (mouse-faced sangkawad and hasp-fish) and the Pseudentropius genus (kad fish and hasp-fish), can be recognized by their short back-fin, stout spine, small fat-fin and long bottom-fin. The plabuk which is found in the Mekong and goes up to three meters in length is also in this family but has been newly named Pangasianodon gigas. There are only two genera of the Sisoridae family but many species such as the kongkang, Glyktothorax platypogonoides, which is a small fish. They can be caught in Thailand in mountain streams of Nakhon Sithammarat Province and can attach themselves to stones even in rapid water. Then there is the plakha and the lizard fish (Bogarius bogarius) which are found throughout eastern countries but have not been found in Thailand. The cat-fish family (Tachysuridae) is well known by its short back-fin, strong spine, small fat-fin, two holed nose, valve, etc. There are about 20 species, 15 of which are in the genus Tachysurus. Cat-fish are important food fish for persons close to the seashore and along the Mekong River. Some species get quite large and some, or perhaps all, species are said to hatch their eggs in the mouth of the fish. The eggs are large but few in quantity. The male stores the roe in its mouth until the young hatch. Cat-fish that live in brackish water (Osteogeneiosus) or khohkaso (called samuy cat-fish, whiskered cat-fish, uk cat-fish, short-headed uk cat-fish and soft-headed uk cat-fish) have the same living habits as those mentioned above. Of the other genera in this family the genus Ketengus includes the large-headed cat-fish, rock cat-fish, yellow cat-fish, rock-headed uk, etc. These are small fish with wide mouths. The genus Hemipimelodus includes the pho cat-fish, the uk, white uk, salt-water uk, red uk, etc. In the fresh-water there are three species and the genus Batrachocephalus or frog-headed fish which are found in only one place, that is in the southeastern part of Thailand. The repugnant fish family (Bagridae) consists of about 15 species. Of this number 10 species are of the genus Mystus which are fresh-water fish that are edible. The genus Bagroides and the genus Leiocassis comprise five species each which are found along the waterways. They are black and white striped. The last family is of the eel phylum (Amblycipitidae) of which there is only one

species not longer than 12 centimeters. They are found in India and Burma but only in the central part of Thailand.

A large family of scaled fish is the Cyprimidae family which includes the common edible fresh-water fish of which there are many and which are the most important fish in Thailand. From the research that has been made to date, there are about 30 genera and 75 species of these fish and there are likely many more yet to be categorized. Fish in this family comprise many species of fish from other places, such as the Chinese carp (Cyprinus carpio), which the Chinese call the leeko or seehu, and the gold and silver fish (Carassius auratus). These fish were specially raised and released in the rivers, canals, etc. This family has the most genera and species including the genus Puntius (Puntius stigmatosomus) with 13 species, the genus Labiobarbus (Dangila leptocheila, Dangila siamensis) with six species, the genus Cyclocheilichthys (takok, namlang) with six species, the genus Osteochilus (Osteochilus hasselti and Osteocheilus melanopleura) with five species, and the genus Rasbara (Rasbara argyrotaenia) with seven species.

The Cobitidae family (Acanthopsis choirorhynshus) includes four genera and six or seven species. Two of these species occur in great quantity, sufficient to be caught and sold at the marketplaces. They are the species Bodia modesta (white Acanthopsis choirorhynchus) and Bodia hymenophysa (striped Acanthopsis choirorhynchus).

There are only two species of the Gyrinocheilidae family (Gyrinocheilus kaznakovi and their minnows and the plamut) which are caught. One species is gotten from the island of Borneo and the other is caught in the central region of Thailand.

An example of a fish that is plentiful and is marketable just about everywhere, in Europe, Asia and Africa, is the Clupeidae species which includes the green-backed fish or herring, as it is called in English. There are many species of these fishes caught in Thailand including the shad (Hilsa) which is a salt-water fish that comes into fresh waters creating a fishing industry along the Chaopraya River. There are at least two species of the round shad of the Dussumieridae family in Thailand. There are also two species, Dorosoma chacunda and Dorosoma nasus, of the Dorosomidae family. Other fishes in the shad family found in Thailand include the swordfish group of the Chirocentridae family. The species which is caught in the Gulf of Siam is the Chirocentrus dorab which is called the Laotian swordfish. The Megalopidae family includes a species of the fierce-eyed fish, the Megalops cyprinoides, which can be compared to a species that is found in the state of Florida in the United States. Normally this species stays in salt-water but sometimes they come into fresh-water, therefore in Thai it is called the fresh-water fierce-eye. The family Chanidae, which includes the sea Cirrhinus microlepis found nearly all over the world, also includes the Chanos chanos species.

The Cirrhinus microlepis is sometimes called the fresh-water scomber and the cholin.

The Engraulidae family (plakay, almond fish, and corica soborna) is called anchovies in English, and are plentiful in Thai waters. There are also many fresh-water species. From research carried out to date there are about seven genera including 14 species. It is quite possible that other species found in Burma, Malaya and the Malayan island group are also found in Thailand.

Fresh-water fishes that are found everywhere are of the Notopteridae family and include the flat-tail fish of which one species (Notopterus notopterus) includes the feather-back fish found along marshes, swamps and most lowlands in general. Another species, Notopterus chitala, attains a length of nearly a meter and can be found in large streams. It swims by moving its large white fan-like tail and arches its body proudly on the surface of the water, therefore it is called the proud fish.

A large and important family of fishes that have quite varied characteristics is the Serranidae family which includes the perch. This family should include the Lates calcarifer which are the white perch and the fresh-water perch that have such a good taste and are the most numerous, too. This species is found in salt-water and in the esturaries where the salt-water is found. One species of this family is Cromileptes altivelis which the Chinese call kao. They are pleasing to the eye because they have large brown and red spots. The genus (Epinephelus) includes the grouper of which 14 species have been found already. Further research could well turn up additional species.

The Lutjanidae family includes the red perch group which likes to hunt food along the bottom of the Gulf. In any place suitable this group can be found. The genus Lutjanus includes the red perch, plapan, and the heavenly-colored fish of which 10 species have been found to date. The Therapon genus includes the Therapon theraps, Therapon pula, prompraw, phinphat and the renad of which there are only four species. They are found everywhere along the seacoast. The Pomadasidae family which includes the krataykhud, krathikhud, sikrud and the axe-head, are small fish found in abundance along the coast. At least 10 species of these fish have been found already and there are believed to be others.

The Scombridae family includes the Cybium commersoni group of which some species are important and others remain to be researched. Fish in this family, which swim back and forth in the deep sea far from shore, include the bonito group of which there are many species in the Gulf of Siam. Sometimes these bonito are called pan bonito, string bonito and bent bonito. Fish in the Scomberomorus genus of this family are called Spanish mackerel in English; there are three species of this fish and they are good eating. The fish of this family that are most important to the Thais and also are the most numerous fish of this family is the

scomber (Rastrelliger kanagurta), a small fish.

The Carangidae family includes the sikun, Alectis indica, and Scomberoides sanctipetri of which there are many species. Some species are plentiful. The genus Caranx of this family includes the sikun, sikhon, Caranx forsteri, etc. of which there are over 12 species. They are, for the most part, small fish. Fish of the Alectis genus include the Alectis indica or plachum; on this fish the points of the dorsal fin, the bottom fin and the ventral fin are long cotton-like threads. There are many species and in English they are called thread fish. The Scomberoides genus includes the Scomberoides sanctipetri and the chaliab of which there are three or four species. One species (Scomberoides lysan), which the Thai fishermen refer to as plachaliab, attains a length of over one meter.

The plachuad (Sciaenidae) is called the drum fish in English. Some species attain a length of one meter or more whereas some species at maturity are only 12 - 15 centimeters long. Both varieties run in schools but the large variety is not encountered often. The small variety is found in large numbers throughout Thai waters.

The eel is included in the Apodes order which translates to "feetless" or stated another way it means a fish without a ventral fin. They are found in Thailand. The true eel family (Anguillidae), which is plentiful in fresh-waters and salt-waters of western and southern Europe and eastern America, is rare in the Gulf of Thailand and adjoining waters. The eel family (Ophichthyidae), which translates to the snake fish family, is found in fresh-waters throughout. The eel species Pisodonophis boro is an eel group that attains a length of about one meter and is regularly sold in the market. This species and another (Pisodonophis cancrivorus) are eels that are caught only along the inner banks of the Gulf of Siam. The family Congridae is called playawd in Thai from the name of the mystical sea monster. In English it is called the conger eel and two species are found in Thai waters. There may be other eel genera and species that have still not been researched. The sea eel family Muraenidae is found along the seacoast where the environment suits it. So far, four species of the family Synbranchidae, which are eels found in swampy regions, have been found. But in contrast to the eels mentioned above, there are only two genera of these eels. These are the genus Monopterus, a small fresh-water eel, and the genus Synbranchus, a small eel also. These eels are of very little value as food. They can live on for long periods of time during the dry season in spite of the lack of water.

The goby family (Gobiidae) is found throughout the world in many species. Some species are plentiful in Thai waters, both fresh-water and salt-water. To date 35 genera and 50 species have been categorized along Thai mud flats by the seacoast, rivers and canals. You can always encounter footless fish, some-

times called plachum phruad or mud gobies of the genus Periophthalmus and the genus Periophthalmodon. In this same environment you might also encounter the kamphud, Apocryptes serperaster, and plachum phruad which are fish of this same family but of the genus Boleophtalmus. There are many species of the small goby which can always be found in the mud flats of Thai rivers and canals. The largest gobies known in Thailand are the Oxyeleotris marmoratus which includes the sleeper goby and the sand goby that can attain a length of nearly one meter and are found throughout Thailand. Another species, which has features and habits much like those already mentioned, is the Oxyeleotris siamensis.

Fish of other families that should be mentioned include the tooth-picking crocodile, which is called the pipe-fish in English, and the sea-horse which are in the Syngnathidae family. The large pipe-fish is found in all the fresh-waters of the central region. Sea-horses (Hippocampus) are found in the Gulf of Siam.

There are many species of the Mugil genus of the Mugilidae family.

The thread-fin fish are in the Polynemidae family and they have dorsal and ventral fins that have threads that serve as organs of sensation. There are about seven species some of which attain a length of a meter.

Baracuda (Sphyraenidae) are called plasak in some places. There are two species, one of which is small and another which reaches lengths up to 1.5 meters.

Many species of the genus Tylosurus and the kneedle fish family (Belonidae) are found throughout the seas. Sometimes they are called the sea kneedle fish and the buffalo kneedle fish. One species is the Xenentodon cancila of the fresh-water genus Xenentodon of which there is only one species. The Hemiramphidae family includes the Tylosurus strongylurus which has an upper jaw that is shorter than the lower. They are called half-beaks in English and they include many species, both fresh-water and salt-water.

The small beak-fish (Dermogenys) and the large kneedle-fish (Zenarchopterus) both have their young live.

The flying-fish (Exocoetidae) is a fish which can fly for short distances. One species which is often found in the Gulf of Siam is named Cypselurus oligolepis.

Plasya (Toxotidae) are fish that squirt water to catch insects for food; this is why they are called shooting-fish in English. One species (Toxotes Jaculator) is a fresh-water fish that is frequently encountered.

There are two species of the Pristolepis fasciata (Nandidae) which are fresh-water fish similar to the bass, found in swampy areas.

There are six species of the Gerres punctatus (Gerridae), a small sea fish with a mouth that can be projected, found all along the seacoast.

The triple-tail or black perch (Lobotes) in the family Lobotidae are found in salt-waters everywhere but are not very numerous.

There are two species of the syataw (Datnioides), a local fresh-water fish.

Some of the more common butterfish (Stromateidae), which are called pomfret in English, include three species of the genus Stromateus (white butterfish, grey butterfish (kaoteuy), and black butterfish).

The globe-fish (Tetraodontidae) is a fish which can inflate its body as a protection against its enemys. They are called puffers or swell-fish in English. There are at least seven species, both salt-water and fresh-water.

The Cynoglossus lingua includes the sole, the buffalo-tongue and the tiger-tongue of which there are many species. Most are salt-water fish but there are also several fresh-water species.

The serpent-head family (Channidae) are fresh-water fish that are found everywhere and are an important food fish for the Thai. Fish in this family have a snake-like head, therefore they are called serpent-heads in English. There are eight species of the Channa genus; three of these are large and are marketable. This family has special gills that help it breathe out of water.

The climbing-fish family (Anabantidae) is very close to the channidae family. The climbing-fish (Anabas scandens) is called the climbing-perch in English. They are common in swampy areas and pools in Thailand. This species has an extra breathing organ that enables it to breathe out of water so that it can live on land for considerable lengths of time. Unusual fins and gills enable them to climb banks and tiny trees and sometimes they can be seen struggling on dry land. This family comprises six genera which are found in ponds and swampy areas. The rhinoceros fish (Osphronemus goramy) are the largest group in this family but they are extremely rare in Thailand. The gouramy and the pilot-fish (Trichogaster) includes four species. One of these species, the pilot-fish, has some value as a food-fish. The other species are rather small.

The Helostoma genus includes the mawtan that is called in some places baytan (Helostoma temmincki), etan, we, and eko. There is only one species in the central region.

The Ctenops vittatus of the genus Trichopsis and the fighting fish of the genus Betta are species believed to have evolved from Betta splendens. They are bright green and red in color and they have been raised to fight as this is a Thai sport.

V. Snakes

Snakes are one form of wildlife that everyone has seen in Thailand but when it comes to the number of species, there are

far fewer than in India or the Malayan Archipelogo, and they are not as dangerous to man as the snakes in these two places, either. All the species are well-known and there are not likely many that are unknown. About 95 species have been categorized already and, in addition to these, there are about 20 species of sea snakes.

Earth-snakes (Typhlops) are snakes that are in a lower order than the others. They are small and comprise altogether about seven species. Earth-snakes look much like earthworms and usually stay underground or under logs and piles of rubbish. Their eyes are small and used only to distinguish daylight from darkness.

The largest native snakes are the boa (Python reticulatus) and the python (Python molurus). In other places these snakes attain lengths of over 10 meters but not in Thailand. Boas are found throughout Thailand, even in heavily congested places, gardens, and buildings. They turn up quite often even in Bangkok. The average length of these snakes in Thailand is 3 - 3.6 meters. The longest recorded one caught was six meters long. Boas like to look for food at night. Food of these snakes consists of small mammals and some species of the winged animal phylum, e.g. dogs, cats, mice and ducks, chickens, etc.

The most numerous snakes, both in species and number, are in the Columbridae family (rag snake, brown-tailed grass-snake, Coluber radiatus, lizard-head grass-snake, lizard-mouth white-snake, striped-neck snake, Tropidonotus sub-miniatus, lizard-mouth kapa, ghost snake, krodang, grass-snake). There are about 31 genera in Thailand that can be divided into about 75 species, not including the sea-snake species. These snakes are not dangerous to man except for those in the sub-family Elapinae (Cobra).

A snake in this family which should be mentioned is the elephant's trunk (Acrochordus javanicus) which has a body that is rough and irregular and a loose skin. Some attain a length of 3.5 meters and its body can be measured by the very large bands that encircle it.

The fish-eating snake (Natrix piscator) is numerous along the banks of streams and canals. At the most they might attain a length of 1.2 meters. In addition, there are five or six other species of the same genus.

The mice-eating snakes (Zamensis mucosus) include the rat-snake which is found nearly everywhere in Thailand. They can be seen often around buildings in Bangkok, and they average in length from 2.5 - 3 meters. Except for the boas and pythons, the rat-snake is the longest.

The Indra curtain-string snake (Dendrophis pictus) is found in large numbers everywhere. Some as long as 1.2 meters have been found. They can jump from tree to tree.

Snakes of the Simotes genus are of average length and include five species. There is the rattlesnake and Simotes cyclurus,

etc. (the latter is called sometimes the Burmese peafowl snake because its beautiful coloring is attractive to the eye.)

The fish-snake (Hypsirhina homalopsis) comprises 10 species. One of these is the kradang (Herpeton tentaculum) which is peculiar in that it has a pair of long whiskers protruding from its nose.

The lizard-headed grass-snake (Dryophis mycterizans) is called the whip-snake in English because of its small long body that may attain a length of 1.5 meters or longer. Its body is tree-leaf green and it likes to stay in trees. Once seen it is easy to remember because of its wide mouth, the upper part of which is long and pointed.

The grass-snake (Chrysopelea ornata) is a strong and fast-moving snake. It is about 1.5 meters long and is found everywhere, even in Bangkok and other large cities.

There is only one species of the streak-snake (Cylindrophis rufus) in Thailand. It is usually found under tree stumps and piles of rubbish or in underground holes. It has a short blunt tail and when it coils it usually raises its tail up to conceal its head. When it does this it gives the appearance of a poisonous snake about to strike, but in fact this snake is of no danger at all to humans. In Malaysia and Indonesia these snakes reach nearly a meter in length at times.

The percentage of poisonous land snakes is small. Some species are very rare or a particular poisonous snake might be found in only one locality. So far, only 13 species have been noted. There are two species of the cobra phylum, three species of the coral snake phylum (there is no Thai name for this snake, so the English name is used), three species of the krait phylum, and five species of the kapa phylum.

In the cobra phylum, which are large and very dangerous, there is the king cobra which is sometimes called the jungle cobra in Thai. They are found throughout the jungles of Thailand. At maturity they are over three meters long normally but specimens of over 4 - 5 meters have been found. The longest one ever killed was caught in Nakhon Sihammarat Province in 1924; it was 5.5 meters long. The king cobra will not run from man; a person bitten by one can die within a matter of minutes. It has been said that there have even been instances of elephants dying from the bite of this snake.

The potted-cobra (Naja naja) is found throughout Thailand, in the jungles and in urbanized areas on occasion. These snakes attain a length of about 1.5 meters. The longest one recorded was 1.9 meters.

The coral group is scarce. They usually are found in very mountainous regions. There are two species of the genus Doliopis and they are stranger than other poisonous snakes because their venom glands are not located in the head as is the case with other snakes, but are located about 1/3 of the way back along the body.

The krait (Bungarus fasciatus) is found throughout Thailand. It is believed to be very poisonous but it will not attack a person unless forced and it is very timid. Therefore few persons are ever bitten by this snake. A krait killed at the Bangkok Nursing Home was 2.9 meters long, the second largest recorded krait. Two other species of the krait are Bungarus flaviceps and Bungarus candidus (snake that drops on a crouching tiger). Specimens of these snakes have been found in the mountains of Nakhon Sithammarat Province and Siratcha District respectively.

The Thai russel viper (Viper russelli siamensis), which is called the Siamese russel viper in English, is numerous in the central and eastern regions. Bangkok is likely as far south as these snakes are found in Thailand. The longest ever recorded was only 1.3 meters. But russel vipers in India are longer than this and many persons die from its bite. In Thailand not many persons are bitten by this snake. The kapa (Agkistrodon rhodostoma) is sometimes called kapa fala, sometimes pakbuk, sometimes tyng chang and in the northwest region it is sometimes called tyng kaba. It is as poisonous as the copperhead or moccasin of the American continent. In Thailand they are found in sandy localities and they are short, usually shorter than one meter. As for other snakes that fall into this same family, there is the genus Trimeresurus which includes the brown-tailed grass-snake. They are found throughout Thailand and in the orchards of Bangkok and Thonburi Province. They are less than one meter long and although their bite will not kill a person, it can make them violently ill for a time. Another species (Trimeresurus wagleri) is said to exist only in Malaysia but some have come into the southern part of Thailand. Malaysians call this snake "ulabakaw" which translates to "crooked tree snake". Another species (Trimeresurus monticola) has been encountered only rarely. They exist in the high places of the northwest and southern regions. The Malaysians call it "ulakapa".

Sea-snakes are found in large numbers in the Gulf of Siam, along the western coast and in the mouths of the large rivers. They can attain a length of one meter but such cases are rare. A sea-snake can be easily recognized by its flat-sided tail which it uses to swim. There are six genera, namely Platurus, Hydrus, Hydrophis, Enhydris, Enhydrina (light-colored neck) and Thalassophis. These genera are divided into 16 species. Of this number, 12 species are of the genus Hydrophis. Although all the sea-snakes are poisonous and a person can die from their bite, they are docile and slow-moving by nature and will not attack anyone. Therefore chances of being bitten by a sea-snake are slim. About the only persons ever bitten are fisherman fishing in the sea or in the river mouths who are not careful when they catch one.

VI. Creeping Wildlife

Creeping wildlife includes the gecko, house-lizard, chameleon, small flying lemur or byng kapik, wood-lizard, brown-lizard, iguana, skink and miangu. There are six families divided into about 75 species and they vary greatly in appearance, size and habits. They are found throughout Thailand; inside buildings, in fields and gardens and in the jungles.

About 17 species of the gecko of the Geckonidae family are familiar in the various localities. It is an animal with a brittle tail that can easily be cut. Its toes can expand enabling it to creep along very flat surfaces. They are nocturnal creatures that eat insects, for the most part. The species of this family that is commonly found around buildings is the house gecko (Gecko verticillatus) which sometimes reaches a length of 30 centimeters. Although the gecko is not dangerous to humans, if a person tries to catch one he might be bitten. There are two other species in this same family and their places of habitat are much the same as those of the gecko mentioned above.

The tree-lizard (Gymnodactylus) comprises only five species. In the genera Gonatodes, Phyllodactylus, Lepidodactylus, Mimetozoon and Ptychozoon there is but one or two species per genus. As for the small house-lizard which is numerous nearly everywhere in Thailand, there are the species Hemidactylus frenatus, Hemidactylus plutyurus and Gehyra mutilata. These species of animals are beneficial to man in that they help to control insects.

There are about six genera of the chameleon of the Agamidae family and these are divided into about 20 species. Normally they like to stay in trees. The flying-lemur which is called the flying dragon in English is an animal of this family. There are about 11 species in Thailand. They have one peculiarity in that their last rib bones protrude and are covered with a thin membrane that can be stretch out like wings. These help the creature glide from tree to tree. When the flying-lemur is just perched on a branch these wings are drawn into the body so that it is impossible to tell that it can fly. Some places refer to this creature as the byng kapik. Some species of this phylum can change their color, especially the color of the wing membranes, the neck and the appendages hanging from the neck. As for the chameleon in other genera such as the genera Gonyocephalus, Calotes (chameleon), Acanthosaura, Physignathus (top-heavy body), and Liolepis (wood-lizard), some species such as the chameleon genus Calotes, can change the color of their bodies. Some species, such as the wood-lizard, are beautifully striped and may attain lengths up to a half-meter. They are usually found around sandy places and change their color when angered or annoyed. They can also inflate their bodies. The wood-lizard is edible and is usually caught by traps or snares set at their holes.

Creeping animals of the Varanidae family include the iguana

and skink, or, as they are called in English, monitors or water lizards. Four or five species of these creatures can swim and they like to stay in the woods bordering the rivers and canals. There is at least one species of this group which attains a length of up to 3.5 meters, has a long neck and small head, is stoutly built and has a powerful tail similar to the giant chameleon of ancient times that wandered through the deep jungles.

The skink family Scincidae includes about 27 species. For the most part, they live on the ground and have a long but brittle tail. There are divided into the following genera: Lygosoma (skink), with 16 species; Mabuia, with five species; Tropidophorus, with five species; and Isopachys, with one specie.

Of the creeping creatures in Thailand, there are still two families, the family Lacertidae (long-tailed skink) and the family Dibamidae, but each family has but one specie. Tachydromus sexlineatus is called the snake skink in English. They stay in areas of tall grass in various places in Thailand. They have green backs with black and white stripes running along the sides of their bodies; their tails taper but break off easily. The tail is about four times the length of the head and body together, therefore the overall length is probably around 35 centimeters. Another species is Dibamus novaeguineae (doesn't have a Thai name) which is found in only one place in souhern Thailand. They are strange in that they are somewhat similar to earthworms. They are no longer than 20 centimeters and have no front legs. Their hind legs are very small and only the male has legs at all. The eyes are small but, in spite of the fact that they are covered with skin, it has been determined that they have eyes.

VII. Frogs and Toads

Frogs and toads are plentiful and can be seen often throughout Thailand. The small green frogs are encountered in some seasons and in some localities. During the night when the rain is coming down and then ceases, they can be heard singing. Some species sing loud enough to bother one's ears. Frogs, green frogs and toads are very beneficial for man because they consume many, many insects and frogs can be eaten too. As far as is known to date, there are about 60 species of the frog and toad group in Thailand. If a list were made of frogs and toads by locality the number of species would almost certainly increase greatly.

About 47 species of frogs have been categorized already from 11 genera. Frogs found throughout the world include frogs of the genus Rana of which there are 23 species. There are three genera of bull-frogs, Callula, Calluella and Glyphoglossus. There are about seven or eight species of the frog genus Microhyla and they are numerous and found everywhere.

Toads of the genus Bufo comprise four species. One species

is Bufo melanostictus which is found everywhere, even in Banhkok. Five species of the genus Megalophrys are usually found in the mountains and jungles.

The earth-snake (Ichthyophis) is an animal similar to the earthworm. It can exist both in water and on land like the frogs and toads that are born in the water. When they mature they don't have tails or gills. There are two species. One species is numerous in Bangkok; it is without adornment and rather dull-colored. It likes to dig its holes close to a source of running water and when it rains they scamper about quickly.

VIIICrocodiles

There are two species of Thai crocodiles. One species is the salt-water crocodile (Crocodilus porosus) which is found in places from China southward as far as the Indonesian Archipelago, Australia, Fiji Islands and the Phillippines. In Thailand they are found at the various river mouths and sometimes go out into the sea. This species attains lengths up to 10 meters but in Thailand they are not over six meters long. They eat fish, but also eat other animals, both water and land animals. They will eat humans, too, and do indeed kill many every year. Another species is called the Thai crocodile (Crocodilus siameusis). It is smaller than the first and is found inland along the bogs, swamps, rivers and canals. They don't usually get longer than four meters and are found in some places in the central and southern regions. There are also fresh-water crocodiles in Cambodia and Indonesia but they don't attack people. Occasionally people are reported attacked by them but these are usually children and it occurs very rarely. The biggest part of the crocodile's diet consists of fish and some do like to eat dogs, but only in a few localities. Crocodile meat is edible.

The takhong (Tomistoma), called gavial or gharial in English, is a species of crocodile with a very long narrow snout. For this reason they are called long-nosed crocodiles in some places. They are found among the various islands, in Indonesia, the Phillippines and Australia. They are also found in the southern region of Thailand and are a fresh-water crocodile that may attain lengths of four meters or more.

IX. Turtles NEXT

There are many groups and varieties of turtles in Thailand. Some of these species are turtles that are common nearly everywhere in the world, but some are unique to Thailand.

A familiar sea-turtle is the tanu (Chelonia mydas) which is called green turtle in English. They come up on the sandy

beaches and islands to lay their eggs. One turtle can lay enough eggs at one time to produce hundreds of young. Some persons eat the eggs and they are marketable, therefore various countries, including Thailand, forbid the taking of turtle eggs and fine those caught breaking the law. It is felt that without this law this turtle species would eventually become extinct.

The hawk-bill turtle (Eretmochelys imbricata) is a species of sea-turtle the shell of which consists of large scales which can be used for making various things. Therefore, they have market value. Turtles are common everywhere in the sea and the Gulf of Siam is one place where they are rather numerous.

Another interesting turtle species is the bright-shelled turtle (Batagur baska), a fresh-water turtle. As far as is known, they lay their eggs in only one locale in Thailand and that is on the inland beaches of Songkhla Lake or the inland sea. Without protection this species might soon die out.

Another species of large sea-turtles is the Caretta caretta (don't know of a Thai name) that is called loggerhead turtle in English. Another large species is the fluted turtle (Dermochelys coriacea) that is called leather-back turtle in English. They are found in small numbers in Thai waters so are therefore not an economically important turtle.

Land and fresh-water turtles are familiar in Thailand. There are as many as nine genera which are divided into 15 species. One species that is often encountered is the snapping turtle (Trionyx cartilagineus) which attains lengths up to 80 centimeters. They are sought after for their delicious flavor. There are from 12 - 14 species of the fresh-water turtle family (Testudimidae) which includes the folding turtle.

X. Birds

Birds are the warm-blooded animal phylum which is quite familiar in Thailand because many Westerners have researched and collected specimens of Thai birds for mounting in the museums of various countries and writers have written many articles on Thai birds in the Siam Association publications.

Speaking in general terms, a bird that is commonly encountered is the crow (Corvus macrorhynchus) which is very numerous in Thailand. They are plentiful in nearly every locality, even in Bangkok in such places as Phrachatuphon Temple. Another species in the crow family (Corvidae) is the one referred to in English as magpie. There are other species; one eye-catcher is the kawahn (Crypsirhina varians).

Another group of birds is encountered all the time. Some species are found often around the villages; such as king khrong, singing myna, and the common myna which are part of the Sturnidae family and are birds that sing all the time. These birds normally

gather in small groups. Some species stay around homes, in towns, in gardens and other places. In Thailand there are about 12 species of these birds. One that is often encountered is the Chinese myna (Sturnia sinensis). This bird is sometimes also called the jungle myna bird. In addition there is the black-naked myna (Graculipica nigriocollis), the Siamese myna (Aethiop-sar grandis), the common myna (Acriothires tristis), and the pied myna (Sturnopastor superciliaris). This group of birds like to perch on the backs of the cattle and buffaloes to catch the in-sects that come to suck the blood of these large animals.

The laughing-thrushes and babblers are in the Timaliidae family and they comprise many species. Another related family is Pycononotidae which includes the bulbuls. These birds are singers and are found everywhere in the woods, homes, and gardens.

Fly-catchers (Musicicapidae are small multi-colored birds of which there are many species in Thailand. Some of these species are interesting. An example is the Burmese paradise fly-catcher. At maturity the male of this species has tail feathers the center sections of which have two white lines that run the length of the body and split the body into equal parts. Another fascinating species of this family is the Javanese fan-tailed fly-catcher (Rhipidura javanica) which is found all over Bangkok.

The warbler phylum Sylviidae includes many species found in Thailand. Examples are the fan-tailed warbler, the black-necked warbler and the pointed-tail warbler. All of these are small birds that are referred to collectively as warblers or tailor birds in English.

The robin phylum Turdidae are native birds that comprise many species. A familiar species is the robin (Copsychus saularis) which is found in gardens both in towns and in the countryside. The male has shiny black feathers mixed with white. These birds are called magpie robins in English.

The drongo or king-crow phylum (Dicruridae) is found in all the various localities of Thailand. Native birds include the black drongo (Dicrurus ater) with its beautiful serrated tail. Sometimes they are called the husker-drongo or loop-tailed drongo (Dissemurus paradiseus). The tasseled drongo (Chibia hottentotta) is somewhat larger and they have long combs running close to their tasseled tails.

The rice-bird family Ploceidae comprises four or five species that are called weaver-birds in English. They can be ob-served around cultivated fields where they gather in flocks. They build rather large nests in trees close to buildings, and usually they select trees that droop over the water.

The broadbill family Eurylaimidae is so-called because of the shape of its beak. They live in trees in the jungle and eat fruit for the most part. The local varieties of the broadbills comprise many species. They are very beautifully colored; the species with the most beautiful feathers is the long-tailed broad-

bill (Psarisomus dalhousiae) with their green back and chest feathers, indigo tail feathers, yellow neck, partly black head, tufted comb, yellow and silver feathers. The largest broadbill is the king broadbill (Corydon sumatranus). It has grey feathers almost 30 centimeters long, a very wide bill, rather white neck and breast, black back, and yellow or orange spotted sides. Other local varieties of the broadbills include the red and black broadbill (Cymbirhynchus macrorhynchus) and the pink and black broadbill (Eurylaimus ochromalus).

Birds of the passeriformes order which are scarce in Thailand include the wagtails and pipits, larks, shrikes, pittas, orioles, sunbirds and flower-peckers. Two other families that should be mentioned along with this order are Nectariniidae and Diceidae. Birds of both these families are extremely small, live in trees, and their beautiful coloring compares favorably with the humming birds of the western world. There are about 30 species of these birds in Thailand, some of which are beautifully and brilliantly colored.

The king-fisher family (Alcedinidae) is found along the rivers and canals and birds of this family differ greatly in size and plumage from each other. One of the large ones is the large king-fisher (Pelargopsis) which is called the stork-billed king-fisher by some and the red-billed crab-eater by others. It sometimes is 35 or more centimeters long. Another species of the king-fisher (Ceyx) has three-toothed claws. It is rather scarce and has pitiful appearance. It is only 14 centimeters long. More than 12 other species have been noted. The most common of these are the black and white pied king-fishers (Ceryle); dragging-bill king-fisher (Halcyon) which has black head-feathers and white neck rings; piaw-eating king-fisher (Sauropatis) which has a white neck; and the small king-fisher (Alcedo). The king-fishers eat fish and also insects and small shrimp and crabs. It is said that in ancient times the wing-feathers of king-fishers were once collected as taxes from travellers.

The horn-bill (Bucerotidae) is a family that is unusual because the birds of this family have very large beaks and have lumps protruding from their heads that form combs. They usually stay in the jungles and are loud singers. Their diet consists mainly of fruit and they build their nests in hollow spaces in trees. When the female starts hatching the eggs her spouse brings sticky things to plug up the cavity. Then when the hole is too small for the male to enter he feeds the female. The flight of the small pied horn-bill is also extraordinary in that the wind rushing past the wing-tip feathers causes a loud spine-tingling sound that can be heard for long distances. The horn-bill might have been domiciled in Thailand because it is found in many species from the southern to the northernmost parts of the country. There are the small horn-bill (Anthracoceros), deaf horn-bill (Rhinoplax), wreath-necked horn-bill (Rhyticeros), combed horn-bill

or Malaysian horn-bill (Berenicoruis), flower-combed horn-bill (Anorrhinus), and the giant horn-bill or kahang (Dichoceros) some of which reach lengths up to 1.4 meters long. They are found everywhere in jungles with tall trees.

In the owl family Strigidae, according to research carried out so far, there are about 10 species. One familiar species is the barn owl (Strix flammea) which is found on the continents of Europe, Asia, Africa and America. Other species include the horned-owl (Huhua), whistling-owl (Scops lempiji), and the small owl (Glancidium brodici). Those that don't have a Thai name are the kite (Ninox), fish-owl (Ketupa), and the woods-owl (Syrnium). (The Thai names for this group is derived from the English name.)

Birds that are closely related to the owl group, but are separated according to a new procedure, include the night-jars and goat-suckers of the family Caprimulgidae. They are nocturnal birds with tufted feathers and large eyes. Their talons and beaks are not as strong nor as sharp as the owl. There are about five species that fall into three genera. Those found in Thailand are the wide-bill (Lyncornis) and the frog-mouth (Batrachostomus). (The Thai name for this bird is derived from the English meaning.)

The birds of the Cypselidae family, which are native birds of Thailand, include the palm swifts and the cave swifts of the genus Collocalia. These birds are very important economically because their nests, which they build for rearing their young, are edible. When steeped in water they have a jelly-like consistency and are expensive. These birds build nests in great numbers along cave walls and there are persons who make incomes of hundreds of thousands of baht a year by collecting and selling them. Besides these two species there is the large swallow (Chaeturo gigantea), a bird found in high mountains.

The woodpecker of the Picidae family comprises many species and is found everywhere. Of the Thai varieties that are found in the jungles that are suitable for them, about 20 genera comprising 40 species have been categorized to date. This also includes the small woodpeckers of the genera Iynx and Sasia.

Barbets of the Capitonidae family have a special feature in that they have talons growing atop one another, two in front and two in back, similar to the talons of the woodpeckers. They are found throughout the jungles of Thailand and several species can be encountered in fruit orchards. They eat fruit and several species make a loud rythmic sound from which their name was derived. One species that is more common than the others and can often be heard singing around Bangkok is the small barbet named Xantholaema haematocephala. Other species that are fairly common are the striped-barbet (Thericeryx), brown barbet (Calorhamphus fuliginosus), silver-throated barbet (Cayanops asiatica), yellow-bearded barbet (Chotohea chrysopogon), vari-colored barbet (Chotorhea rafflesi), and the large Chinese barbet (Megalaima vireus). These birds are found in the mountain jungles of the

northern region.

The pheasant (Cuculidae) is a large bird family. There are many native species, about 13 genera divided into more than 25 species. One species found in Bangkok and other places is the Indian koel (Eudynamis scolopaceus). Another species is the long-tailed crow-pheasant which likes to stay along the ground in wooded areas near villages and roadways. They crow "pood-pood" in the early morning around dawn and at night.

The Thai parrot of the Psittacidae family comprises about seven species, the parrot group (Pisttacula) with six species and the number-six parrot (Loriculus) with one species. Parrots go out to hunt food in flocks and their singing can be heard throughout the jungle.

Birds of the flesh-eating phylum include the hawk Falconidae and the vulture Vulturidae of which there are many species. It is possible not to encounter any of these species but there will be many flying to and fro in the skies above the towns, rivers, canals and swampy areas. Two species are encountered more often than the others, these are the red hawk (Haliastur indus) which is called brahming kite in English, and the black hawk (Milvus govinda) which is called pariah kite in English. There are many other hawk species such as those of the hawk genus Circus which are called harrier hawks in English, horned-hawk Aceipiter, Poliohierax, Lophospizias which are called goshawks in English, Astur called shikras in English, Baza and falconets (Microhierax). The osprey (Pandion haliaetus), which can be encountered wherever conditions suit it, includes some species which are interesting such as the hawk-eagles (Spizaetus and Lophotriorchis), serpent-eagle (Spilornis), buzzard-eagle (Butastur), fishing eagle (Polioaetus), and the spotted eagle (Aquila). The vulture phylum which is found in Bangkok and other places includes the red-headed black vulture that is sometimes called the king vulture (Sarcogyps carvus), the white-backed brown vulture (Pseudogyps bengalensis), and the long-beaked vulture (Gyps tenuirostris).

Doves and pigeons of the Columbidae family comprise many species. Some species are common around villages, whereas some are found only in the jungle. Birds in this family include the ground dove, ring dove, turtle dove, cuckoo dove, wood pigeon, green pigeon, imperial pigeon, etc.

Pheasants of the Phasianidae class that should be mentioned are the species with the beautiful plumage. The jungle chicken (Gallus ferrugineus) is found nearly everywhere and is thought to be the ancestor of present-day domestic chickens. Argus pheasants (Argusianus argus) are beautiful birds found in the southern region of Thailand. Native birds of this family that are appealing to the eye include the firebacked pheasants (Lophura), peacock pheasants (Polyplectrum), silver pheasants (Gennaeus), wood partridges (Caloperdix), francolins (Francolinus), and bill partridges (Tropicoperdix).

Since Thailand has a bountiful supply of fish, it has a bird phylum that eats fish. These are the birds that glide back and forth looking for fish, such as the crane, the egret, etc. in the Ardeidae family. There are many species and large numbers of these birds. Some that can be easily observed are the white cattle egrets that like to look for food in the fields and often can be seen perched atop water buffaloes. They are sometimes called the leech-eating bird. Others include the pond herons (Ardeola), night herons (Nycticorax), purple herons (Ardea), chestnut bitterns (Ardetta) which are sometimes called red egrets, and black bitterns (Dupetor).

Birds related to the above family but placed, nevertheless, in the Ciconiidae family include the white-necked storks (Dissura), black-necked storks (Xenorhynchus), painted storks (Pseudotantalus), adjusted burds (Leptoptilus), open-bill birds (Anastomus). Birds in the Ibididae family include the giant ibises (Ibis and Thaumatibis). All these birds like to hunt for their food along the swamps and waterways everywhere. They eat fish, frogs and toads but the open-bill birds are said to eat only one species of seafood such as creeping snails or pond snails.

The rail-bird family (Rallidae) hunts its food in swamps and marshes. There are many species that are native. One species that is often encountered in the gardens and waterways is the white-breasted water-hen (Amauropsis phoenicurus). Other species are the red mouse-bird (Amauropsis fuscus) and the water-cock (Gallicrex cinerea), both of which are called simply water-hens in English. The purple moorhens (Porphirio poliocephalus), sometimes called green birds, are rather tame.

There is only one species of the Gruidae family in Thailand. This is the sarus crane (Grus antigone sharpie) which has a red head and grey plumage. It stands about two meters tall and is usually encountered in the jungles of the central and northern regions. Tame ones that have been caught and reared in domestication can also be seen in Bangkok walking in the gardens.

Many birds of the Charadriidae family, of which there are many species are migratory and will fly far out of the country. Most of these birds lay their eggs in distant places at the far north of the world. Some of those that migrate to Thailand include the lapwing (Lobivanellus), snipe (Pluvialis), wood-sandpiper (Rhyacophilus), fan-tailed snipe (Gallinago), pongwid (Rostratula), etc. The snipe is seen in the fields at the end of the rainy season and some species stay along the seashore.

Birds of the Jacanidae family have long, pointed talons that are suitable for running on the marshy ground of the swamps and marshes. Native species include the bronze-winged jacana (Metopodius indicus) and another species (Hydrophasianus chirurgus) which is called by the same name but which has a longer tail than the former. Both of these species are usually found where conditions suit them. There is another bird in the closely related

family Glareolidae which includes two species. It is in the genus Glareola and the Thais call it the eriad bird.

Gulls of the Laridae family are found along all costal regions and large river mouths but not in great numbers. Some species are the same varieties as are found world-wide, such as the large gull (Hydroprogne caspia) and the small gull (Anous stolidus). Besides these, there are some local birds in Thailand, such as the brown-headed gull (Larus bruneicephalus), white-legged gull (Sterna sinensis), and the swamp gull (Hydrochelidon).

Birds in the teal phylum and Anatidae family include the pedhi (Dendrocycna), silver-winged duck (Querquedula), cotton-teal goose (Nettopus), combed teal (Sarcidiornis), etc. In addition, there are two species of water-birds (Phalacrocorax). These are birds (Anhinga) for which there are no direct Thai names, so the English names, snake-bird or indian darter, are used. The pelican (Pelacanus) is white and is found along swampy areas and rivers in the northern section of Thailand.

XI. Mammals

The Primate order includes monkeys, gibbons, etc. (humans are also in this order). Animals of this group that are native comprise several species. Those of interest include the gibbons of the Hylobates genus. The species with the white palms (Hylobates lar) is a species found everywhere but their hair varies in color. They are fun-loving animals. A species of monkey that is close to the gibbon but has a long tail is the langur (Presbytis). There are about 12 species including the sub-species; and they are found throughout Thailand but they are found in numbers only in a few places. In the southern part of Thailand there is a species of short-tailed monkey which the natives catch and train to climb the coconut palms to pick the fruit. Small monkeys of the Macaca genus comprise many species and are found everywhere. As far as is known, there are 10 species that are encountered frequently including the crab-eating monkey, the stump-tailed monkey, the pig-tailed monkey, etc.

An interesting animal that is close to the monkey is the lemur or bashful maiden (Nycticebus tardigradus). It is a small tailless monkey and is nocturnal. It is thick-haired. Sail-boaters sometimes take lemurs along in the belief that they have some magical power to ensure that there is ample wind when desired.

Among the jungle animals of Thailand the elephant (Elephas maximus) is the most important animal. It is found in the jungle everywhere that can support its growth. They are protected by the government which prohibits anyone killing them without permission. The natural habitat of the jungle grows ever smaller because the jungle is being increasingly destroyed to make way for fields and plantations. Elephants are used to pull and drag trees

that have been cut down for logs. For this reason, in the northern region where there are teak forests, large numbers of elephants are raised for this purpose. Elephants are also used as a means of transportation into hard-to-reach places where other animals have trouble reaching.

The hooved phylum is of Ungulata order. One group is the one-horned rhinoceros (Rhinoceros sondaicus), a small rhinoceros, and the two-horned rhinoceros (Rhinoceros sumatrensis). Both of these species stay in the deep jungle far from civilization and they are becoming harder to find because they are hunted for their horns and blood which are sold for high prices as medicine for strength and cure of certain diseases. In this animal phylum there is also the tapir (Tapirus indicus) which has odd features. It looks much like a large boar. Its snout extends out to a small tip similar to a trunk and its body is grey with white streaks. It likes to sleep in mud-holes and is nocturnal.

The wild boar (Sus cristatus) are scattered throughout the country. The male is larger than the female, and can be very dangerous when wounded.

Animals in the Cervidae family include the various deer that are placed in the true deer group. There is the wood-deer (Cervus unicolor) which is the largest of the deer and is found throughout Thailand. It is called the sambar deer in English. The brow-antlered deer (Cervus eldi) is found everywhere, also. The hag deer (Cervus porcinus) is found in the grasslands of southwestern Thailand and some other places. The saman (Cervus schomburgki) is found only in Thailand; is quite rare, being found in a few limited places and could become extinct. Barking deer or hog deer of the Muntiacus species also represent many species found in Thailand.

Animals with features partly of the wild boar family and of the deer family are the false-deer group such as the Chevrotains (Tragulus) or mouse-deer of which there are two or three species that are generally identified with given areas. This animal family does not grow taller than 45 centimeters and has no antlers. The male has small projecting teeth. They are found everywhere, more in some localities than in others. There is also a species on some of the small islands.

Serow or goat antelopes (Capricornus sumatrensis), as they are called in English, like to inhabit the high mountains of southern and northern Thailand. There are many varieties. In the mountains of northern Thailand are another species of this family called mountain deer (Nemorrhaedus grisens) but it is quite hard to find.

Animals of the buffalo phylum, in addition to the domestic buffalo, include the jungle buffalo (Bos bubalis) which is found in various localities, and the jungle ox of which there are two species, the black bison (Bos gourus) and the red jungle ox (Bos sondaicus). Both species have very large horns and, for the most

part, are found in the mountains. They will put up a brave fight against an enemy when attacked.

Animals of the cat family (Felidae) include the tiger or striped tiger (Felis tigris) which is found nearly anywhere in the jungles where food is available, and where it can well conceal itself. Tigers rarely attack humans unless they are attacked first, except for old or wounded tigers. In these cases they are unable to obtain their normal food, so they attack and kill humans. Many more persons are killed by these kinds of tigers than by any other. The leopard (Felis pardus) is found in nearly all the jungles of Thailand, sometimes even along the village paths. Leopards of the black variety, or black tigers as they are sometimes called, are usually found in the southern part of Thailand whereas the other, smaller species are found in various localities. There are also fire tigers (Felis temmincki), fish tigers (Felis viverina), jungle cats (Felis bengalensis), syabong (Felis chaus), etc.

There are two breeds of domestic cats (Felis domestica) in Thailand which Westerners like to raise because they feel they are very lovable and beautiful. One breed is the gray cat which has dark brown feet, tail tip, ears and mouth, and silver eyes. The other breed is the ash-gray with yellow eyes. Besides these there are the breeds that are common in Southeast Asia, that is, are not limited to Thailand. They vary in colors and usually have stub tails.

There are many species of the civet in Thailand, such as the Indian civet (Viverra zibetha) which is larger than the rest, the Burmese civet (Viverra megaspila), the small civet or musang (Viverricula malaccensis), and the striped civet (Linsang maculosus) which is a scarce breed. Sometimes we call this last civet species the tiger-striped palm-civet. There are also many species and breeds of the common palm civet (Paradoxurus), which are found everywhere. They are a very annoying creature for they like to steal duck eggs and fruit to eat. Their long tail can be used for grasping things. The common species has gray hair with black spots and a ringed tail.

The otter (Lutra barang) is found nearly all over the country and is often seen along the rivers and large canals. One species (Lutra sumatrana) has tufted hair at its nose and has been found in southern Thailand only two or three times. The small-clawed or clawless variety (Aonyx cinerea) is common all the way from the Malayan Peninsula tip to the Lake of Songkhla. The common otter can be tamed.

Among the carniverous phylum in Thailand which should be mentioned are the jackals (Canis aureus) and the hyenas (Cyon rutilans), both species that hunt in packs. None of these species can be said to occur in great numbers anywhere in Thailand.

There are two species of bears, the dog or pig bear (Helarctos malayanus), which are called Malay or honey-bear in

English, that is found in the southern part of Thailand; and the oxbear or black-bear (Arcticonus thibetanus), called the Thibetan bear in English, which likes to stay in the mountains, especially in the northern part of Thailand. Another species is the Indian sloth bear (Melursus ursinus) which has coarse hair and a long snout. It is known that this bear was once prevalent in many places in Thailand, but it is uncertain if it is still present in the country.

The insect-eating animal phylum includes the large flying-lemur (Galeopterus) which has fine hair. It likes to stay in trees and is as large as one meter. They can always be found in the southern part of Thailand. The small chipmunk (Tupia) has features and habits much like the squirrel, of which there are many species. In various places there are two other genera of animals of the insect-eating phylum; these are the ground shrews, Pachyura and Crocidura, for which the Thai names are unknown. There are many species of these animals. The mole (Parascaptor) lives in a hole, is fine-haired, small-eyed and has a white tail.

There are many varieties of bats (Chiroptera) and there are countless numbers of them. There are over 60 species that have been found in Thailand, including the flying-fox (Pteropus) which is the largest bat of this group on the Asian continent. There are four or five native species. Usually they perch in groups in large trees with their heads hanging down. Groups of as many as 1,000 bats have been seen hanging from a tree at one time. They are nocturnal and can do great damage to fruit orchards. There is also another group (Cynopterus) of fruit-eating bats that includes many species. There are about 20 genera of native insect-eating bats. The species Rhinolophus and Hipposideros occur in greater numbers than the other species. They like to reside in caves, temples, and in palm trees. At dusk they go out to hunt for food in large flocks. These bats eat insects and therefore are considered to be of considerable benefit to man.

Animals of the gnawing phylum that includes the squirrel, rabbit, mouse, porcupine, etc. fall into the Rodentia order. In the mammal group that is found in Thailand, the gnawing phylum is the most numerous. There are about four genera of flying-squirrels that are divided into 10 species, including the sub-species. As for the other species, there is the chipmunk (Menetes), tree-dog (Ratufa), squirrel (Callosciurus), etc. There are over 60 other species in other genera, including the sub-species. They are very plentiful in localities having trees. Their colors vary from pure white to pitch black; there are even some that are light yellow and some that are bright red; and there are striped ones. The largest species of squirrels is found in large numbers in the mountainous jungles. Including their tail, they sometimes reach 1.2 meters in length. Some have black backs and

white breasts. The large woods rabbit (Lepus siamensis) is common in all the major areas of Thailand. The mice phylum which is included in the same genus as the house-mouse (Rattus) is very, very numerous. They are found in houses, in the jungle, in the fields and just about everywhere else. There are at least 50 species, including sub-species, of the mouse. There are also mice of other genera including the white-tailed mouse (Hapalomys) and many more species, such as Rhizomys (bamboo-rat), Nyctocleptes (large bamboo-rat) and Cannomys (small bamboo-rat). In the gnawing phylum, there is the porcupine group which should also be included. There are two genera of porcupines, Acanthion (short-tailed porcupine) and Atherurus (round-tailed porcupine). These two genera include about four species.

The scaly-ant-eater (Manis javanica) are animals that live in holes. They have a short head and short body but long tail. They have interlocking scales, instead of hair, to protect them from enemies. It is almost like an armor that wraps around its body while it sleeps. The scaly-ant-eater, of which there is only one species, is a native to Thailand. It is in the Edenta order which are mammals without front teeth. The country people eat the meat and the scaly hides are sold to the Chinese who make medicine from them.

Mammals that live in Thai waters include, in the Cetacea order, the porpoise or dolphin which is often encountered in the Gulf of Siam in schools. The whale is another mammal species which are seen once in a while. They are usually small; large ones are rare. Not much research has been done on the whales in Thailand, therefore it is still not certain to which genera or species they belong. Many years ago the skeleton of a whale was unearthed in a field west of Bangkok at least 25 kilometers from the seashore. It was placed on display once in Bangkok. The sea-cow, of the Sirenia order and Halicore genus, looks much like the small whale. It is believed that the mermaid may have been derived from this animal because, when one sees its head sticking out of the water from afar, it looks very much like a mermaid. Its food is sea vegetation. The Malaysians call it the dugong and this name is also sometimes used in English. Some even call it water-pig because the Malaysians like to eat its meat and consider it to taste much like pork.

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CHAPTER 5

NATURAL RESOURCES

I. Minerals

Minerals are an important natural resource of Thailand because they have long been the country's third most valuable export. Some of the important exported minerals are tin, tungsten and lead but the mining industry is steadily expanding due to the discovery of new mineral deposits and the mining of many varied minerals. At the present time iron ore, manganese, fluorite, gypsum and antimony are also exported, therefore minerals as an export are gaining in importance daily. In addition to these there are minerals mined for home use, namely marble, limestone, soapstone, building stone, stone for road construction, gems, rock salt, lignite and oil. There are still many other kinds of minerals that have not yet been exploited, such as asbestos, barite, copper, feldspar, graphite, molybdenum, white gold and nuclear ores (radioactive ores and ores used in producing atomic energy).

Tin - There are numerous tin ore deposits found in many places. The deposits that are heavily mined are those in the southern region. Here there are large mining operations run by foreign interests. So far tin deposits have been discovered in the following provinces: Chumphon, Prachuapkhirikhan, Ranong, Takuapa, Phangnga, Phuket, Suratthani, Nakhonsrithammarat, Songkhla, Yala, Pattani, Ratchaburi, Kanchonburi, Phetchonburi, Uthathani, Tak, Chiang Mai, Maehongson and Chiangrai.

Thailand is the world's fourth largest producer of tin. In 1961 it produced 19,386 metric tons.

Nearly all of the tin mined in Thailand is exported; only a very small amount is smelted within the country.

An important, but rare, form of tin is cassiterite. It is usually brown or black in color but yellow and white samples have also been found.

Uses for tin - Tin is used to coat sheets of iron for

making tin cans, etc. In addition, tin is mixed with various metals to make solder and welding materials, typeset, bronze, and many other things.

Tungsten - The important kinds of tungsten are wolfram or wolframite and scheelite. Most of the Thai deposits are wolfram. This mineral is the second most important mineral, economically speaking, of the minerals found in Thailand. Deposits of wolfram are usually found along with tin deposits. Important deposits, from a standpoint of quantity and quality, are found in Maesariang District, Maehongson Province and in Pilok Township, Thongphaphumi District, Kanchanaburi Province. In addition, wolfram is found in the provinces of southern Thailand in the tin deposits or close to the tin deposits.

In 1952 Thailand produced 1,627 metric tons of wolfram. After that production dropped due to a drop in the price of wolfram, so that in 1961 only 474 metric tons were produced.

Uses for wolfram - Wolfram is of very great importance in heavy industry because it is mixed with iron to make steel that is used to make tools that can withstand high temperatures; it is used as an alloy to give softer elements special strength such as the metal used in making stone-cutting tools.

Pure wolfram or wolfram mixed with just a slight amount of other metals is used for making electric bulbs and radio tubes.

Wolfram is used for making dyes, ink, glass, and is used in x-ray machines and television sets.

Lead and zinc - Lead and zinc are usually found together. There are four important lead-zinc deposits in Thailand: Nongphai, Sriswat Sub-District, Muang District, Kanchanaburi Province, which is mostly lead; the Huaitham deposit in Phrae Province, which is mostly zinc; the Thamthalu deposit in Yala Province, where the lead ore is sandwiched between layers of tin and tungsten; and the Sangkasi deposit in Maesot District, Tak Province.

Uses for lead and zinc - These metals are mixed with many varieties of metals. Lead is made into sheets, pipe, coverings for electrical conductors, and ammunition. Zinc is primarily used for galvanizing iron.

Gold - Thailand has many gold deposits; there are gold deposits in up to 28 provinces. Most of the gold is mined by digging a hole and seining or panning the ore. Gold has long been sought until, at the present, there is very little ore left in known gold fields. The few familiar gold mining areas in Thailand include Kabinotburi District, Prachinburi Province; Tomo, Mamoong Township, Waeng District, Narathiwat Province; and Thatakoo, Lopburi Province. In addition, there are areas where gold is easily obtained by digging and seining. Some of

the more well-known places where this is possible include the Paron deposit, Bangsaphan District, Prachuapkhirikhan Province and the Huailuang deposit, Chiangrai Province. At the present there is still some seining for gold but there is no gold mining.

Uses for gold - It is mainly used as backing for bank-notes. It is also used for jewelry and is mixed with other metals for use in dentistry and many kinds of scientific tools. It is also used in electrical circuitry.

Silver - In Thailand the silver deposits do not occur isolated but rather silver is found generally with lead deposits such as the Nongphai lead deposits in Kanchanaburi Province which contain about .03% silver by weight.

Uses for silver - It is used for coinage and jewelry and for plating metals. Its chemical qualities are used in medicine and photography and it is used in making colored glass, as well.

Iron - Iron ore deposits are found in many of the provinces of Thailand but not much research has been done on them because the interest in iron ore has only recently come to the fore.

Two deposits which have been worked are:

1. The Thapkhwai Mt. deposit, Khookkathiam Township, Muang District, Lopburi Province is being exploited by the Thai Cement Co., limited to supply its iron-smelting plant at Tha-luang Township, Tharua District, Phranakhonsriayutthaya Province;
2. The Kaosamai deposit in Suratthani Province produces ore for export to Japan.

Six deposits that are still unexploited include:

1. The Huawai deposit, Takhli District, Nakhonsawan Province;
2. The Phusang deposit, Chiangkhan District, Lei Province; this deposit is estimated to be the largest in Thailand but complete surveys are yet to be carried out;
3. The Phulek deposit, Chiangkhan District, Lei Province, very close to the Phusang ore;
4. The Umkhrum Mt. deposit, Bophloi Sub-District, Muang District, Kanchanaburi Province;
5. The Lek Mt. deposit at Ban Roonglek, Thasala District, Nakhonsrithammarat Province;
6. The Nongbon deposit, Plaengyao Township, Bangkhla District, Chacheungsao Province.

In addition to the deposits already mentioned, there are still many smaller deposits which have, for the most part, received only cursory surveying to date. These include:

1. The iron deposit in Muang District, Utaradit Province;
2. The Bonamphi iron deposit in Tron District, Uaradit Province;

3. The Bodam iron deposit in Long District, Phrae Province;
4. The Boluang iron deposit in Hot District, Chiang Mai Province;
5. The iron deposit in Phrankratai District, Kamphaengphechon Province;
6. The Kaolibong iron deposit in Kantang District, Trang Province;
7. The Kaocham iron deposit in Kaolanta District, Krapi Province;
8. The Thong Mt. iron deposit in Muang District, Krapi Province;
9. The Namnoi iron deposit in Hatyai District, Songkhla Province;
10. The Ban Wang iron deposit in Muang District, Phatthalung Province;
11. The Phang Mt. iron deposit in Sichon District, Nakhonsrithammarat Province.

Uses for iron - Iron is a metal of industrial importance and is used in the manufacture of nearly every type of utensil used in the daily life. At this time Thailand has but one small iron smelting plant, that of the Thai Cement Co. at Thaluang. However, the Thai Government is presently taking a greater interest in iron mining and is contemplating building iron-smelting plants.

Manganese - Manganese ore is found in many places and has been mined in many places already. Some of the places producing manganese are:
1. The Huaisuak deposit in Buhom Township, Chiangkhan District, Lei Province;
2. The Pakchom deposit in Chiangkhan District, Lei Province;
3. The Ban Maechong deposit in Li District, Lamphun Province.

Deposits that are not currently being exploited include:
1. The Bungphlu Mt. deposit at Ban Thonglang, Ban Rai District, Uthaithani Province;
2. The Huaipharae deposit in Ban Rai District, Uthaithani Province;
3. The Kaokhram deposit in Chonburi Province;
4. The Kaolan deposit in Chonburi Province;
5. The Unglu deposit at Khaewyai in Sriswat Sub-District, Muang District, Kanchanaburi Province;
6. The Luboyirai deposit in Mayo District, Pattani Province;
7. The Huatophran deposit at Ben Bralo, Mt. Pawae, Mt. Samao, Mt. Tibu and Mt. Sukae, Yala Province.

Uses for manganese - It is used in smelting metals and

mostly in the making of steel. It is also used in the smelting of aluminum and magnesium. It is mixed with other metals and is used in the chemical industry to produce many kinds of chemicals, such as potassium which is used for developing films, making dry cells, solder, paint, fertilizer, medical supplies, glass and dinnerware.

Antimony - Antimony deposits include the following:

Deposits being exploited:

1. The Phakhan deposit and the Phakho deposit at Denchai Township, Sungmen District, Phrae Province;
2. The Ban Kaen deposit in Sopprap District, Lampang Province;
3. The Ban Song deposit in Ban Nasan District, Suratthani Province.

Deposits not yet being exploited:

1. The Huaikrathing deposit and the Maekua deposit in Kaokha District, Lampang Province;
2. The Maetaluang deposit in Chaehom District, Lampang Province.

Uses for antimony - It is mixed with other metals to improve their quality and increase their durability. It is mixed with lead to make dry cell electrodes. It is a component of munitions, is mixed with lead to give lead added strength, and is used in tracer bullets.

Antimonium oxide is used in many kinds of metal equipment. It is used in spray paints and it is used in the rubber and cloth-making industries. It is used to make fire-proof cloth.

Copper - There are many copper deposits in Thailand but none have yet been discovered that are of sufficient quality and quantity to make it profitable to mine. Some of the deposits that exist include:

1. The Khanongphra deposit, the Chanthuk deposit and the Bohinriang deposit in Nakhonratchasima;
2. The Phetchonbun deposit which is located at two places, at Huaiphi which is nine kilometers south of the town of Phetchonbun, and at Padaeng which is six kilometers east of the same town;
3. The Lampang deposit which includes three sites, at Ban Tan which is very close to the town of Lampang in Ngao District; at Huaihi which is close to the village of Ngiwngam in Maetip Township; and at Huaichan in Luangnua Township;
4. The Utaradit deposit which includes three sites, at Ban Huainiam and Ban Pia in Nampat District; the Bophawiang deposit at Ban Songhong, Ban Siaw Township, Faktha District; and the Ban Wangsamphan deposit, Muang Chetton Township, Faktha District;

5. The Taphamok deposit in Long District, Phrae Province which is about 15 kilometers northeast of the Ban Pin railroad station;

6. The Lainan deposit and the Huaiphung deposit in Sa District, Nan Province;

7. The Ban Wangchao deposit in Chiangthong Township, Muang District, Tak Province;

8. The Khookkathiam deposit on the slopes of the Phrabatnoi hills in Lopburi Province;

9. The Huaihindat deposit in Khuyaimi Township, Phanomsankham District, Chacheungsao Province.

Uses for copper - Copper is a good electrical and heat conductor, therefore it is used in the production of electric wiring and electrical equipment. It is used in radios, televisions, telegraph and telephones. It is widely used in machine construction, in autos, planes, railroad equipment, ships and scientific tools. It is used in many alloys such as bronze, brass, etc.

Molybdenum - No large deposits of molybdenum have yet been found. It has been found in tungsten-lead veins and in the granite of the Pekamathai vein but in very small quantities. Only one actual deposit has been discovered, along the banks of the Nam Khun Canal in Chanthaburi Province. At the present there is no one interested in digging this ore for sale.

Uses for molybdenum - It is mixed with steel to give the steel special qualities. The molybdenum metal is used in the electrical industry, and is a component in airplanes. Compounds of this metal are used in making dinnerware, lubricants, fertilizer, insecticides and chemicals.

Nuclear ores - Nuclear ores include those ores that are used in atomic production. These ores can be divided into two categories, one of which is radioactive and has very different characteristics from the other category. These radioactive waves are short frequencies which are invisible. The other category is not radioactive but is useful in controlling the nuclear reaction of atomic energy.

There are many kinds of radioactive ores but for ease of discussion these will be divided into two categories, uranium ore and thorium ore.

Uranium has been discovered in Thailand in deposits of tin in many provinces of the southern region, such as Ranong, Takuapa, Phangnga, Phuket, Suratthani, Songkhla and Yala. But detailed surveys have not been made of uranium deposits so that it is not yet known whether the ore occurs in quantities sufficient to warrant commercial exploitation.

As for the thorium ore category, much monazite has been found in many spots along the seacoast, such as at Hua Hin where

monazite is found in the form of yellow granules mixed with the sand, or sometimes it occurs in green stripes. Monazite ore is also commonly found in areas where tin ore is found. It is found in the heaps of waste materials at the tin mines. This occurs because the current market price of monazite is not high enough to make the reclamation of this ore profitable.

Other non-radioactive nuclear ores include beryl and the columbium-tantalum family which are used to control nuclear reaction.

Only very small quantities of beryl have been found, in the region of the tungsten mines in Hatyai District, Songkhla Province.

Columbium-tantalum ores have been found in many places in the southern region where tin is mined.

Asbestos - There are two asbestos deposits in Utaradit Province which are not currently being exploited:

1. The Monkaichae deposit in Muang District, Utaradit Province;
2. The Bosamkha deposit which is five kilometers north-northwest of Ban Phaluat.

Uses for asbestos - It is used to make fire-proof cloth and insulating cloth. Sheets of asbestos are used for ceiling tile; it is mixed with paint to make it fire-proof, and with cement to serve as an insulator.

Graphite - Graphite can be found in scattered small sheets or in granite and other rock. The deposit at Mt. Phang in Chanthaburi Province was once worked but there is no longer any deposit in the country that is being worked.

Uses for graphite - It is used as a coating for molten metals used in printing and in molten metal crucibles. It is used to make paint, lubricants and black pencils. It is used as electrical contacts in electric smelting furnaces.

Gems - Some of the well-known Thai gems include the sapphire, ruby, topaz and zircon.

Gem deposits occur in the provinces of Chanthaburi, Trat and Kanchanaburi but the well-known deposits have been nearly exhausted. The method used to find gems is to dig shallow holes in the deposit and sift the dirt from the gems.

Gem ores (in this writer's understanding) are ores used only for jewelry, etc., but in actuality the zircon, ruby, topaz and sapphire have many industrial uses, as follows:

Zircon is pulverized into a dust used for making dinnerware, decorative sand, firebrick for aluminum-smelting ovens, and it is used in glass-making. The metal zirconium is used in atomic fission and in many alloys.

Ruby is used in the watch-making industry but is

presently being replaced by corundum.

Sapphire is used in the watch-making industry, similar to ruby.

Ruby and sapphire are corundum minerals the shavings of which are used in making grinding wheels, sandpaper or polishing cloth.

Topaz has no other use.

Diamond - Small diamonds have been found in the refuse of tin mines in Phuket and Phangnga Provinces. Officials of the Bureau of Mines found a .335 carat diamond at the Phuket Tin-Mining Co., Ltd. and a .349 carat diamond at the Kammunting Tin-Mining Co., Ltd.

As no diamonds have yet been found directly in the rock, the source of these diamonds is uncertain.

In addition to the quality diamonds used for jewelry, there are also diamonds that are used in industry. Because it is the hardest element, diamond is used in grinding wheels, drill heads, and, in dust form, to polish very hard materials.

Pakodite - This mineral could almost be placed in the same category as soapstone. It has been found at Mt. Changok in Nakhonnayok Province.

The paper mill belonging to the Thai government once dug pakodite to mix with the paper pulp. Pakodite in sheet and brick form is used to make such utensils as vases, flower-pots, trays and lampshades. The naval signalmen once dug pakodite to use in electrification and in making fire-resistant objects.

Fluorite (Fluorspar) - Deposits of fluorite are found in many places in Thailand. Three important deposits are:

1. The Paktho District deposit in Ratchaburi Province, which has been mined for many years already;
2. The Tao Mt. deposit in Li District, Lamphun Province, which has just begun to be mined;
3. The Pai District deposit, Maehongson Province.

Uses for fluorite - It is used as a fuel in smelting steel. It is used to make hydrofluoric acid which is used in the aluminum industry and the chemical industry. It is used for glazing. Fluorite crystals are used in making lenses and prisms for microscopes and telescopes, and in making jewelry.

Gypsum - A gypsum deposit that is being mined is the Wangngiw deposit in Bangmunnak District, Phichiton Province is a very large deposit. In addition, there are four other deposits:

1. The Maemao deposit in Ban Dong Township, Muang District, Lampang Province;
2. The Maekua deposit in Kaokha District, Lampang Province;
3. The Songhong deposit in Nampat District,

Utaradit Province;

4. The Nonsung deposit in Nakhonratchasima Province.

Uses for gypsum - It is used in making cement, fertilizer, paper, pencils, paint, rubber, and lime that is used in plaster and whitewash for walls.

Barite - Four deposits have been discovered:

1. The Huaiphot deposit in Chiangkhan District, Lei Province;
2. The Ban Pin deposit in Long District, Phrae Province;
3. The Nampat District deposit in Utaradit Province;
4. The Maesot District deposit in Tak Province.

Uses for barite - It is mixed with mud in exploratory drilling to serve as a lubricating element and, at the same time, to keep the drill-head from overheating. It is used in making glass, paint, ink, oilcloth and rubber.

White clay - The seven deposits of white clay that have been discovered to date are:

1. The Pangkha deposit in Chaehom District, Lampang Province;
2. The deposit in the vicinity of Mt. Suthep in Chiang Mai Province;
3. The Maikhet deposit in Muang District, Prachinburi Province;
4. The Prasae deposit in Klaeng District, Rayong Province;
5. The Banglamung deposit in Banglamung District, Chonburi Province;
6. The Hatso deposit in Satahip District, Chonburi Province;
7. The Ban Na deposit in Ban Nasan District, Suratthani Province.

Uses for white clay - It is used to make dinnerware, and is used in the paper, rubber and paint industries.

Diatomite - Diatomite is a kind of siliceous mineral which is derived from the remains of one kind of one-celled creature that lives in the sea, lakes and waterways. In Thailand it is found at one site in the Wang River basin in Lampang Province. This basin includes the territory from Hangchat District to Maemao District, about 18 kilometers south of the railroad station. Diatomite is found in a thick layer near the surface along the rim of the south bank of the Maechang Stream, a tributary of the Wang River. It has not yet been exploited.

Uses for diatomite - It is used as an absorbent, as an abrasive polish, as a filter, as an insulator, etc.

Marble - A marble deposit that is currently being exploited is one located in Phraphutthabat District and Muang District of Sraburi Province.

Uses for marble - It is used for construction and is carved into ornamental objects and various utensils. Small pieces of marble are used for polishing stones and as flux in glass factories.

Salt - In the northeastern region many layers of salt have been found by drilling. Some of these salt layers are very thick; for example, in Udonthani Province one drilling still had not passed through the salt layer after 1,113 feet. In addition, salt has been found in the provinces of Nongkhai, Nakhonphanom, Sakonnakhon, Kalasin, Ubonratchathani and Chaiphumi. From surveys made to date it is estimated that there is sufficient salt to support a large chemical industry.

Uses for salt - In addition to table salt, there is salt that is used widely in industry for producing chemicals and acid, such as soda, sodium bicarbonate and caustic soda which are used in the metal industry for smelting metal and purifying the minerals and metals. In the chemical industry they are used for making soap, dyes, laundry detergents and cement. These salts are used for purifying water, for cleansing cotton and paper and for preserving food and wood. They are used in the dinnerware industry. They are used in refrigeration equipment, oil refining and for making medicine, animal food, fertilizer and insecticides.

Coal - Coal is the product of the degeneration of trees and vegetation over a period of thousands of years. The old coal which has been formed under pressure or heat from beneath the surface of the earth is of high quality. Good quality coal has only recently been discovered at one place in Phetchonbun Province; but this deposit is so small that it is not estimated to have commercial potential. The only other coal deposits are lignite, a poor quality coal, located as follows:

1. The Maemao deposit in Maetha District, Lampang Province, a large deposit which has been exploited since 1955;
2. The Ban Pudam deposit in Muang District, Krapi Province, a large deposit that is being surveyed and will soon begin producing lignite for fuel in an electric power plant.

In addition to the two important deposits of lignite mentioned above there are other scattered deposits in the provinces of Trang, Suratthani, Nakhonsrithammarat, Yala, Chiang Mai and Nan.

Uses for coal - Coal is a very important natural fuel. It is a resource that is basic to industry, that is, it is used in smelting metals, producing electricity and producing steam for railroad engines. In addition, other by-products are gained from coal such as kerosene, crude oil, ammonia, plastic, etc.

Oil shale - Oil shale has been found in the following places in Thailand:

1. The Umphang deposit in Umphang District, Tak Province;
2. The Muang District deposit in Krapi Province.
3. The Li River basin deposit in Li District, Lamphun Province.

Uses for oil shale - Oil can be extracted from it.

Oil - Oil has just been discovered in Thailand in Fang District of Chiang Mai Province. The Administrative Staff for Military Power is currently carrying out oil surveys and began producing oil for refinement in 1959.

From the geological surveys it has been discovered that the Korat plateau and the Chaophraya River basin have the geological features that indicate the possibility of oil. At this time the Ministry of Geological Resources is carrying out further geological surveys in these areas.

A. The Development of Mineral Deposits

The mineral deposits already mentioned represent only a small part of the deposits that have been discovered. In Thailand the geological and mineral surveys are still incomplete because these surveys have not been going on long and there are at present still insufficient personnel to carry on this work. Money and equipment are also still lacking to carry out these surveys, therefore the mineral surveys must be emphasized when these become available later, and it is hoped that in the future many more mineral resources will be discovered. Anyway, at present there are already ample deposits awaiting development. Of the minerals that have been discovered in the country already, there are 14 that have special industrial applications. These include iron, lignite, oil, manganese, molybdenum, tungsten, copper, lead, zinc, tin, antimony, fluorite, asbestos and graphite. Once there are additional surveys to ascertain with certainty the size of the mineral reserves and mining has begun to provide raw materials for home industry, the country's economic base will move steadily forward.

II. The Jungle

The jungle, like other natural resources, is something that is provided by nature and is beneficial to man as are soil, water, minerals, animals, vegetation, etc. The jungle is by far the country's most important natural resource.

The jungle is important in three ways:

1. From the standpoint of conservation, in the sense that the jungle provides soil fertility, regular water flow and prevents soil erosion;

2. From the standpoint of a product, in that it provides various woods for use in production, and grass, etc. for wildlife food;

3. From the standpoint of other benefits, such as a wildlife refuge for the various jungle animals which would not long survive if deprived of the shelter and food provided by the jungle.

The jungle, it can be said, is a meeting place for living things. It has trees which are an important form of vegetation both from an economic and biological standpoint.

A group of trees that compose a jungle can be compared to a large number of industrial factories that carry on various forms of production to steadily increase the supply of wood. Therefore, from the standpoint of forestry, the quantity of timber which should be cut in any given year should not exceed the quantity of wood which the jungle is able to produce in a year. If this is not done the jungles will deteriorate and gradually be destroyed resulting in a loss to the nation.

Usually many years are required for trees to mature to the point where they can be useful to man. Mahogany, which grows wild in the jungle and is being regularly cut for commercial purposes, requires hundreds of years to reach maturity. For this reason, the country's forestry program must receive very careful attention; it must be a long-range plan to conserve the abundance of the jungle so that it will be a perpetual resource. If such a program is put off until the jungle is destroyed, it is difficult to restore it to its original condition in a short time.

There is a proverb which is applicable to the jungle which states, "We sow not what we see." This should serve to remind us that the trees require many years to mature. What is planted today bears fruit in the future and the planter does not have a life long enough to see the results of his planting.

At present, the advance of science and the increase in world population has brought home the importance and necessity of the jungle in regard to the comfort and well-being of man. All around us are things produced from the jungle, such as paper, cloth, tables, chairs, various utensils and even the buildings in which we live.

The jungle is of direct benefit in three ways:

1. The people use the products of the jungle in every-day living. The most important product in this respect is wood, which is used in the construction of housing, boats, rafts, bridges, tools used in industry and agriculture, firewood, charcoal, paper, etc. Other products of the jungle include herbs

used in disease prevention; tree bark from which liquid is extracted for tanning hides and making dyes; various resins used for making varnish, etc.; wood oils, etc. The jungle is the source of fragrances, leaves, flowers, fruit, hemp and rattan, various bamboos, sealing wax, honey, grass, etc.

2. The people earn their livelihood by working in various industries that use products of the jungle as raw materials, such as laminated wood factories, paper mills, plants that extract wood chemicals, match factories, wood-carving plants; and this labor that is dependent upon the jungle is in turn dependent upon the conservation of the country's jungles. The Department of Forestry also has many employees. The felling, cutting-up, transporting out of the jungles and floating of the logs down-stream are basic occupations of the people and this type of labor will be needed as long as there is wood.

3. The jungle is a source of income for the country because the products of the jungle and the products of the wood industries that are not consumed within the country can be exported. This is good for the country's economic base. There are several countries in Europe, such as Finland, etc., which receive a large part of their income from forest products.

From the standpoint of secondary benefits gained from the jungle, it is a fact that the prosperity of the country will not be an enduring thing if we are left without fertile soil and a regular water supply, both of which are vital natural resources necessary to the well-being of man. Since early history there have been examples of the prosperity and the downfall of various civilizations, such as the Greeks, the Egyptians, etc., that are good testimony to this fact.

As the same time, the preservation of the soil and water is closely related to the preservation of the forests. The importance of forests to the conservation of soil and water is something that has been recognized for a long time. Testimony to this fact is that Europe as far back as the Middle Ages has had laws protecting the forests.

The forests are beneficial in that if rain falls on mountain slopes that have no trees or vegetation at all, the water will flow down the slopes to the closest waterway. It will flow rapidly with nothing to hinder its flow and the water level will rise rapidly. Very little of the water is absorbed into the soil. But when the rain falls in the forests the treetops hold some of the water and the rest falls to the ground which is covered with organic matter and leaves that fall from the trees and which absorb and store a great amount of water. The rain on the trees gradually drops from the branches and runs down the trunk to the ground. The water that is absorbed by the soil also slowly seeps into the ground to feed various streams that flow throughout the year instead of all running off in a very short time as is the case in clear areas where there is nothing

to hinder the water flow thus causing flooding. On the other hand, the water which gradually flows off cannot cause flooding.

The forests also serve to greatly hinder soil erosion because the water flow in the unrestricted areas is fast and strong and causes soil to be loosened and carried along by the water flow. This can be clearly seen in the mountainous areas where rich farm soil along the mountainside has been covered with sand until it is worthless, and the various waterways have been filled with sediment. Sometimes tree stumps and branches are carried down and block streams causing the sediment to fill the channel behind them and eventually change the course of the streams and thereby erode more fertile soil. The extent of erosion depends upon the consistency of the soil. However, on forest-covered mountain slopes the roots of the large and small trees intertwine and hold the soil so that the water current is restricted and the treetops also prevent the rain from striking the ground directly thereby reducing the force of the falling water.

Regarding soil erosion there are examples of the cost of lack of attention being paid to soil conservation in India and China where it is said that huge areas, as large as provinces and larger, lost their fertility and became wastelands where nothing would grow and the populace were reduced to poverty and famine.

Terrain that is forested has different climatic conditions from unforested areas because the treetops serve as a roof that prevents the soil from getting very hot during the day and at night the heat dissipates slowly because the trees hinder this dissipation so that there is less temperature variation than in the open areas. This is particularly noticable in the cold and hot seasons.

When the daytime temperature in the forests is cooler than in the open areas the moisture which evaporates from the leaves of the trees is not great and, for the most part, the moisture remains in the vicinity of the forest raising the humidity. This is why there is more moisture at night in the vicinity of the forests than in open areas far from the forests. Further, if the terrain is high above sea-level the humidity is even higher because it is cooler. It is for this reason that we usually see clouds around high mountain peaks, and when the temperature falls these clouds form large cloud masses and condense in the form of ever-increasing rainfall.

Jungles are also beneficial in the manner in which they affect wind currents by acting as a curtain to reduce wind velocity thereby helping forested localities circumvent the extremes of hot and cold winds. In addition forested areas along the seashore and waterways help to minimize the erosion of the shorelines and help to cause mounds of earth to develop.

Another importance of the jungle which should not be

overlooked is that it is a tranquil home, or in a sense a refuge, for wildlife. This wildlife occupies a place in the preservation of the balance of nature and is of great benefit to mankind. For instance, birds help to control insects that are a menace to agriculture. Therefore various countries have laws to preserve and protect wild animals and set up game reserves so that the wildlife will have food and can continue to propagate their species while man is developing weapons to kill them.

A truly natural forest, in addition to being beautiful, also influences the temperment of the people and makes them cheerful, and they have a love for their country. They love nature and beautiful things. The jungle can almost be compared to a university of nature which Heaven has created as a gift for the country to be used for the joy of its people.

The conservation of natural resources, or as it might also be stated, the intelligent use of natural resources, to get the greatest and most enduring benefit from them, is a necessity for every country and is something which cannot be ignored.

Forests are a type of resource that can be increased but the rate of growth is very slow. Therefore the conservation of our forest resources should be based upon those considerations which offer the greatest returns; that is, steps must be taken to assure that what we already have is not lost. If we cut down trees, catch fish and shoot wildlife in great numbers despite the fact that trees continue to grow every day and the various forms of wildlife can increase their own numbers, the rate of increase is slower than the rate at which they are being depleted; and the rate of increase can go down rapidly if steps are not taken to assure the well-being of these things.

Although there is abundant water in the rivers and waterways and the rainfall rapidly replenishes that which is consumed through the natural flow of the currents, as long as industrial plants are permitted to discard waste materials into these waterways and towns close to the waterways dump filth into them, it will be difficult to make any improvements.

Ground that is used for agriculture, if it is properly managed and improved by adding fertilizer and rotating crops so that the soil has a chance to replenish itself and keep its fertility, is a kind of resource which can revitalize itself and replace that which has been depleted. Chemical materials that are components of the soil are food which crops need, and, for the most part, they are rapidly expended because the soil is used for agriculture. In addition, allowing the land to be sun-scorched by not being planted by a cover-crop for extended periods of time and eroded by rainfall are also important factors in making the soil acid and infertile.

Land on mountain slopes, that were once forest-covered but have been voided of this covering by fire or by cutting, have their fertile soil washed away by the rainfall to lower ground.

This soil is eventually washed on down the streams and brooks and the soil left on the slopes is infertile and worthless. It cannot be used for crops or trees and anything else worthwhile. Thus this erosion is a very important problem because it can occur over wide areas for long periods of time and it usually requires the outlay of great expenditures to improve it.

A. Wood in Thailand

Thailand is a land comprising about 518,000 square kilometers. About 51.03% of this territory is forest.

These forests contain many species of valuable plants and trees and are found in all parts of the country except the plains of the central region, which now has very few forests left because they have been cleared for ricefields and other crops.

The forests of Thailand can be divided into two broad categories, that is the deciduous and the evergreen forests. Both are determined by the kind of tree that springs up in a given forest and this is dependent upon the terrain and weather in each locality.

Deciduous Forests - This type of forest is found everywhere from the plains to the high mountaintops. They can be divided into four broad kinds:

1. Tropical Evergreen Forests;
2. Hill Evergreen Forests;
3. Mangrove Forests;
4. Coniferous Forests.

1. Tropical Evergreen Forests - These forests are found everywhere in Thailand but are especially verdant in the regions of tropical weather and heavy rainfall, such as along the Gulf of Siam on the eastern side of the country and from Prachuapkhirikhan south.

In the northern region tropical evergreen forests are usually found along the moist lowlands and along the banks of rivers and streams up to 1,000 meters above sea-level. At higher levels the forests change to hill evergreen forests.

In the central region there are broad expanses of tropical evergreen forests along the basin of the Pasak River and the Prachinburi River and at the source of the Mae Klong River. Between the central region and the northeastern region there is also a wide line of tropical evergreen forests.

In the northeastern region tropical evergreen forests are scattered throughout but they are usually dry evergreen forests.

Along the Gulf of Siam on the eastern side and in the

southern region about three-fourths of the forested area is tropical evergreen forests. Tropical evergreen forests are found in both mountainous and level areas and stretch all the way down to Malaysia.

Some of the features of tropical evergreen forests are:

The highest order of vegetation is comprised of evergreen trees 30 - 40 meters in height with trunks between 20 - 30 meters in height.

Below the taller trees are countless varieties of smaller vegetation among which are various palm trees, vines, bushes, bamboo and rattan.

In this type of jungle is usually found vegetation belonging to the arum, fern, moss and orchid families which attach themselves to the trunks of large trees.

The jungle vegetation is so dense and lower order vegetation so thick that it is difficult to penetrate the jungle.

Some of the outstanding characteristics of this kind of jungle are the varieties of trees in the Dipterocarpaceae family which spring up everywhere, especially trees of the genus Dipterocarpus.

In the tropical evergreen forests of the northern region of Thailand the common trees are the white gum (Dipterocarpus alatus), red gum (Dipterocarpus costatus), takhian (Hopea odarata), krabak (Anisoptera costata), yomhom (Cedrela toona), daeng dong (Schoutenia bypoleuca), various species of Semecarpus, mahat (Artocarpus lakoocha), krathon (Sandoricum koetjape), wild mango (Mangifera sylvatica), various species of tabaek (Lagerstroemia spp.), mafai (Baccaurea sapida), wild champo (Michelia champaca), various species of cinnamon (Cinnamomum spp.) and mafaen (Protium serratum). Along the banks of streams one usually encounters various species of jambu (Eugenia spp.), teum (Bischofia javanica) and various species of wa (Syzygium spp.). The lower order of vegetation includes bamboo such as hok (Dendrocalamus brandisii), hia (Schizostachyum blumei), various species of palm such as tao (Arenga pinnata), taorang (Caryota urens), kho (Livistona speciosa), various species of rattan (Calamus spp.), and various species of ferns.

The tropical evergreen forests of the central region are much similar to those of the northern region except that the white gum (Dipterocarpus alatus) grows more profusely, and indeed, in some places you could almost call them white gum forests. The bamboo that is commonly encountered is the wild bamboo (Bambusa arundinacea).

There is another type of tropical evergreen forest that is found in Nakhonsawan Province of the central region; that is the dry evergreen forest. The trees that comprise this forest are evergreen, medium height, firm thick leaves and with dense foliage at the top. The species of trees encountered include

the krabaoklak (Hydnocarpus ilicifolius), khongkhaduat (Arfeuillea arborescens), takhianhin (Hopea ferrea), various species of tabaek (Lagerstroemia spp.), and kaew (Murraya paniculata).

In the foothills of the mountain range between Thailand and Burma in the vicinity of Ratchaburi, Phetchonburi and Prachuapkhirikhan Provinces one commonly finds trees of the maklua genus (Diospyros), wa genus (Syzygium) and phalong genus (Memecylon).

The tropical evergreen forests in the eastern part of Thailand are thriving and the most common trees include the white gum (Dipterocarpus alatus), yangnu (Dipterocarpus turbinatus), red gum (Dipterocarpus costatus), takhian (Hopea odorata), krabak (Anisoptera oblonga), khiamkhanong (Shorea sericeiflora), various species of tabaek (Lagerstroemia spp.), somphong (Tetrameles nudiflora), chumphraek (Tarrietia javanica), mahat (Artocarpus lakoocha), tasya (Amoora gigantea), wild mayom (Ailanthus fauveliana), yomhom (Cedela toona), krathon (Sandoricum koetjape), phancham (Hopea recopei) and sathit (Phoebe spp.). In Chanthaburi and Trat Provinces there are yangkhanunnok (Palaquium obovatum), rong (Garcinia hanburyi)and Phungthalai (Sterculia lychnophora) growing intermingled.

The lower class vegetation is dense and includes palm, rattan, climbing vines, rakam (Zalacca edulis), rew (Amomum villosum) and krawan (Amomum krervanh).

Trees found in the tropical evergreen forests of the southern region include those of the yangtakhian family (Dipterocarpaceae) which have conspicuous features. Trees commonly found include the white gum (Dipterocarpus alatus), yangnu (Dipterocarpus turbinatus), yangsian (Dipterocarpus kerrii), yangrong (Dipterocarpus dyeri), yangyung (Dipterocarpus grandiflorus), takhian (Hopea adorata), takhiansuai (Parashorea stellata), khiam (Cotylelobium lanceolatum), lumpho (Intsia bakeri), kankrao (Fagraea fragrans), bunnak (Mesua ferrea), wild champa (Michelia champaca), mahat (Artocarpus lakoocha), khanunpan (Artocarpus calophyllus), chuanghom (Cinnamomum parthenoxylon), mangtan (Schima wallichii subsp. noronhae), tangnu (Calophyllum pulcher rimum), thang (Litsea grandis), Thammang (Litsea petiolata), various species of wa (Syzyigium spp.), raecho (Dehaasia cuneata), yi (Dialium cochinchinense), phai (Adenanthera pavonina) and niang (Pitkicolobium jiringa).

In the southernmost part of the southern region, i.e. Pattani, Yala and Narathiwat Provinces, there are many species of trees not generally found in other sections of the country. These include the takhian chantamaew (Balanocarpur heimii), tinpetdaeng (Dyera costulata), sarayamerao (Shorea curtisii), sarayapurai (Shorea parviflora), etc. In some places there are entire forests of saraya-variety trees.

Most of the vegetation of the lower class consists of wood varieties in the opchei family (Lauraceae), kradangnga

family (Anonaceae), and the madua genus (Ficus). There are also varieties in the krathum family (Rubiaceae), nguakplamo family (Acanthaceae), etc. including the ground-covering bushes.

A characteristic of the tropical evergreen forests of the southern region is that they have very little bamboo, but in the palm group there is the laochaoonkhao (Oncosperma horrida), tree fern (Cyathea latebrosa) and tai (Pandanus houlettii). Various species of rattan grow very densely, especially along the banks of streams and other waterways.

The tropical evergreen forests are of great economic value to Thailand for they are a source of wood used for construction within the country and for export; and they are likely to increase in value as the population and progress of the country increases. In 1960 the amount of yang wood produced, alone, was valued at 128,000,000 baht and exports of this wood brought in 89,000,000 baht. In addition, there is also krathon, tabaek, takhien, khiam, phayung, krabak, somphong, etc.

Important wood products include:

Various kinds of rattan used in making furniture, wickerware, bindings for log rafts and for export. One of the more valuable rattans is takhathong (Calamus caesius) which is found in abundance in Narathiwat Province and is used in making very beautiful furniture and wickerware;

Wood resins used as krabak resin and takhian tamaew resin which are high quality resins used in making a good varnish that is much sought after in foreign countries;

Gamboge, a resin from the rong tree (Garcinia hanburyi), is used in making yellow coloring for clothing dyes and painting;

Wood oils, which one gets from various species of yang wood including yangkhao, yangsian, etc., are used in painting boats and making torches;

Cardamoms and bastard cardamoms, which are planted in large quantities in the eastern part of Chanthaburi and Trat Provinces, are used for preparing food and in medicinal combinations;

Yelutong, a resin extracted from the tinpetdaeng or yelutong tree, is used in making chewing gum;

Essence extracted from krytsana wood (Aquilaria agallocha) and chanhom wood (Mansonia gagei), used to make incense, cosmetics and perfume;

Various kinds of bamboo, used in housing construction in the countryside, making wickerware, furniture, household utensils, fishing equipment, raft pontoons, etc. Much bamboo is exported every year;

Palm leaves, the tender leaves of the palm tree (Corypha umbraculifera), are used in bookbindings, wickerware, toys, hats and farmers caps. There are many palm trees in the woods of Sraburi, Nakhonsawan, Phitsanulok, Phetchonbun and Khon

Kaen Provinces;

Phungthalai seeds, from the phungthalai tree (Sterculia lychnophora) which are found in large numbers in Chanthaburi and Trat Provinces, is used in the making of sweets and are exported to foreign markets.

2. Hill Evergreen Forests - This type of jungle is found, for the most part, in the northern region from 1,000 meters above sea-level and up.

The trees that are worthy of note in this type forest include those of the ko genus (Quercus) and konam genus (Castanopsis). Other varieties of trees found there are the mangtan (Schima wallichii subsp. noronhae), kamyan (Styrax benzoides), champa (Michelia champaca), wild champa (Michelia rajaniana), khahot (Engelhardtia spicata) and Phayamai (Podocarpus neriifolius). Members of the rose family (Rosaceae), the doktaibai family (Ericaceae), the sopchei family (lauraceae) and the khamkhao genus (Rhododendron) are found only in some places.

One feature of the hill evergreen forest is that orchids are common along the trunks of trees and ferns are common. In places where the humidity is high moss can be found growing in thick clumps.

At present the hill evergreen forests are not of much economic value primarily because of the high cost of getting the wood to market and also due to the fact that they do not include many durable woods. However, there are some varieties, such as the wild champa, etc., that are beautifully grained and can be used in construction.

Some of the products that are derived from this type forest include various barks that are used in tanning hides and in betel-chewing. Benzoin is also found often but drilling into the trees produces very little resin, and it is different from the kind of benzoin found in Laos.

3. Mangrove Forests - This type of forest is commonly found along the seacoast in swampy areas both along the Gulf of Siam and the western seacoast along the Indian Ocean. On the eastern side along the Gulf of Siam mangrove forests are found from the mouth of the Chaophraya River to the Bank Pakong River and in the area of Rayong, Chanthaburi and Trat Provinces. At the Welu River between Chanthaburi and Trat there are vast mangrove forests covering a large area of approximately 180 square kilometers.

On the southern side mangrove forests are scattered from the mouth of the Chaophraya River to the Phetchonburi River in the area of Prachuapkhirikhan, Chumphon, Suratthani,

Nakhonsrithammarat, Songkhla, Pattani, Yala and Narathiwat Provinces.

Along the western seacoast which extends from Burmese territory to Malaysia for a distance of about 500 kilometers, it is said that the mangrove forests are the most lush and cover a vast territory. According to available statistics mangrove forests in Thailand cover an area of approximately 2,664 square kilometers. Of this total area about 51% is along the western seacoast and the remaining 49% is along the Gulf of Siam.

Important trees in this type of jungle include those in the koongkang family (Rhizophoraceae) such as the large-leafed koongkang (Rhizophora mucronata), small-leafed koongkang (Rhizophora candelaria), prasak (Bruguiera conjugata), rui (Bruguiera cylindrica), rangkathae (Bruguiera parviflora), prong (Ceriops tagal), etc.

The trees in the koongkang genus (Rhizophora) and the prasak genus (Bruguiera) are normally medium-sized trees, about 10 - 20 meters in height and usually grow in forests of predominately one type tree. However, if there is sufficient moisture and proper weather conditions they do grow to much greater heights and sizes.

Some of the other species of trees that grow in the mangrove forests are the saem (Avicennia alba), saemkhao (Avicennia officinalis), tabunkhao (Xylocarpus obovatus), tabundam (Xylocarpus malaccensis), lamphu (Sonneratia caseolaris), lamphaen (Sonneratia alba), ngonkaithale (Heritiera littoralis), fatdaeng (Lumnitzera littorea), fatkhao (Lumnitzera racemosa), tatumthale (Excoecaria agallocha), tinpetthale (Cerbera odollam), lumphothale (Intsia retusa), etc.

In higher elevations where the land is not under water for extended periods of time there are lower category ground-covering bushes such as the nguakplamo (Acanthus ebracteatus and Acanthus ilicifolius), prongthale (Acrostichum aureum), etc.

Along the banks of canals and other waterways there is the nippa palm tree (Nippa ruticans). In populated areas the nippa palm is cultivated for its leaves and fruit which are marketable.

In addition, there are the phothale tree (Thespesia populnea) and the pothale (Hibiscus tiliaceus) which are easily recognized by their beautiful yellow blossoms.

Mangrove forests have great economic value for when compared with the other types of forests they are more productive. Wood is also easily obtained from these forests because of their close proximity to waterways. Wood obtained from these jungles includes the koongkang which grows rapidly and can be cut for market only ten years from the time it sprouts, thus assuring an early return on investment. In addition, planting or arranging a system of natural propagation for these trees is simple because

they require very little attention. All that is necessary is a proper environment, that is swampy land and saltwater, which is especially suitable to this type of forest.

Charcoal made from koongkang wood and other woods from swampy areas is much sought after for fuel for it is long-lasting and makes a hot fire. These woods are also used for making poles, posts and fish-trap stakes but these uses do not compare in importance to its use as charcoal.

The bark of the koongkang, prong and other species of wood from the mangrove forests is used to obtain extracts for tanning, and for dyeing clothing, fish nets and seines.

4. Coniferous Forests - This type of forest is found in provinces of the northern region including Phrae, Nan, Lampang, Chiang Mai, Chiang Rai, Tak and Maehongson; in provinces of the northeastern region including Srisaket, Surin, Ubonratchathani and Loei; and in provinces of the central region including Phitsanulok and Phetchonbun. This type forest is usually found at heights of 700 meters above sea-level and higher; but there are some places, such as in Srisaket Province, where a pine forest is found on a plateau at a height of only 120 - 150 meters above sea-level. Coniferous forests usually contain only coniferous trees, but in some places deciduous trees also grow in the coniferous forests. Some of these deciduous trees are the teng (Shorea obtusa), rang (Pentacme suavis var. siamensis), hiang (Dipterocarpus optusifolius), hiangrat (Dipterocarpus intricatus) and phaluang (Dipterocarpus tuberculatus). In the southern region and eastern region there are no coniferous forests.

There are only two species of coniferous trees in Thailand, the two-leafed pine (Pinus merkusii) and the three-leafed pine (Pinus khasya). The two-leafed pine grows at lower altitudes and yields more oil than the three-leafed pine.

Varieties of plants that usually comprise the undergrowth in coniferous forests include those of the ko genus (Quercus), the konam genus(Castanopsis), the maodaeng genus (Lyonia), the wa genus (Syzygium), the muatkhon genus (Helicia), etc.

Coniferous wood is useful in construction and furniture manufacture, but is not durable if exposed to the elements. Another important quality of coniferous woods is its long fibres which can be used to make bondpaper. So these forests can be considered a potential economic resource that can supply mills producing bondpaper in the future.

At present pine trees are tapped for raw resin which is distilled into pine essence and dammar which are used in making medicine, oil base for paint and soap. They are also used in miscellaneous other industries.

Deciduous Forests - Deciduous forests comprise about 51% of the total forested area of the country and are found in various provinces of every region except the southern region.

Generally speaking, this kind of forest is not found at altitudes above 1,000 meters above sea-level. They are common everywhere else regardless of how poor the soil or whether the terrain is level or mountainous.

Deciduous forests can be divided into two broad types:

1. Mixed Deciduous Forests;
2. Deciduous Dipterocarpus Forests.

1. Mixed Deciduous Forests - This type forest is of great economic value because it is a source of mahogany (Tectona grandis) the most important and well-known wood in the world. It is exported all over the world and is expensive.

The "five varieties" forest, which includes mahogany and which is also called "mahogany forest", is common in every province of the northern region and as far south as Kanchanaburi Province. In the northeastern region it is found in very small stands in Khonkaen and Loei Provinces which possibly were planted by man.

Mixed deciduous forests are not in mountainuous regions above 1,000 meters above sea-level because at these altitudes they are replaced by hill evergreen forests and coniferous forests. In plateau and foothill areas where the soil is dry or loose, the forests become deciduous dipterocarpus forests. In the damp areas close to streams or along river banks the forests change to tropical evergreen forests or semi-tropical evergreen forests.

Mahogany forests have easily discernible features. They are usually spacious with mahogany trees scattered apart or in small clusters mixed with other species of deciduous trees. In level terrain formed by the soil washed down by large rivers or in suitable soil, such as on limestone mountains, forests of only mahogany trees will spring up.

Trees, in addition to mahogany, that are found in mixed deciduous forests include pradu (Pterocarpus macrocarpus), daeng (Xylia kerrii), various species of tabaek (Lagerstroemia spp.), sela (Lagerstroemia tomentosa), puailuat (Terminalia mucronata), takhro (Schleichera oleosa), makhamoong (Afzelia xylocarpa), kwao (Adia cordifolia), tumkwao (Mitragyna brunonis), samothai (Terminalia chebula), samohaen (Terminalia bellerica), rakfa (Terminalia alata), hew (Anogeissus acuminata), liangfai (Eriolaena candollei), tinnok (Vitex pinnata), oichang (Lannea wodier), takhram (Garuga pinnata), ngun or somphong (Tetrameles nudiflora), tiwkhon (Cratoxylon pruniflorum), makok (Spondias mangifera), sakkhikai (Premna tomentosa), wild ngiw (Smalia insignis), yapkhikai (Grewia tomentosa), krachao (Hotoptelia integrifolia), pichan (Milletia brandisiana), pui (Careya arborea), various species of san (Dillenia spp.) and various

species of po (Sterculia spp.).

Vegetation comprising the undergrowth of these forests includes various varieties with varying features that depend upon the terrain of a given locality. Many species of bushes are common; these include plao (Croton oblongifolius), sifankhontha (Harrisonia perforata), nampuya (Caesalpinia mimosoides); and bamboo such as rai (Oxytenanthera albo-ciliata), bong (Bambusa tulda), sang (Dendrocalamus membranaceus and Dendrocalamus strictus) and khaolam (Cephalostachyum pergracile). In the south of the mahogany area, in the vicinity of Kanchanaburi, wild bamboo (Bambusa arundinacea) springs up in level areas and along the banks of rivers and streams.

From a scientific standpoint mahogany forests are divided into two types, that is dry mahogany forests and wet mahogany forests. In the wet mahogany forests there are normally evergreen trees growing among the mahogany and the forest gradually changes until it finally becomes tropical evergreen forest with no mahogany trees at all.

Mixed deciduous forests that do not include mahogany are scattered throughout the central region and the provinces of Ratchaburi and Kanchanaburi. The important varieties of trees found in these forests are very similar to those found in the mahogany forests. Sometimes trees of the yang family (Dipterocarpaceae) are encountered. The common bamboo found in these forests are forest bamboo (Bambusa arundinaces), ruak (Thyrsostachys siamensis) and rai (Oxytenanthera albo-ciliata).

Mixed deciduous forests have great economic value because the products of this kind of forest are used to produce many kinds of goods. Construction materials and various utensils are made from woods gotten from these forests, such as mahogany, pradu, daeng, chingchan, makha, etc.

Other products of this type forest that are used to make goods are:

Various bamboos which are used to make heavy paper, construct housing in rural areas, used in fishing, produce wickerware and make various utensils;

Raw materials used to make coloring, such as the fruit of the ebony tree (Diospyros mollis) which is used to dye cotton and silk black and fang (Caesalpinia sappan) which is saffron-yellow and is used to dye the sarong cloth for which Indonesia is so famous;

Materials used to tan hides such as the bark of the hew tree (Anogeissus acuminata), the bark of the puchao tree (Terminalia tripteroides), the heart of khun tree (Cassia fistula), the heart of the sisiat (Acacia catechu), the fruit of the samothai (Terminalia chebula), the fruit of the samohaen (Terminalia bellerica), etc.;

Medicinal plants such as the rayom root (Ranwolfia serpentina) which is used for high blood pressure; the fruit

of the samothai and the fakkhun which are used as laxatives, etc.

2. Deciduous Dipterocarpus Forests (padaeng, pakhook or paphae) - This type of forest is widespread in the northern region, the central region and the northeastern region. To the east these forests extend in a narrow line to the north of Prachinburi and Nakhonratchasima Provinces.

In the northeastern region this type of forest thrives and is estimated to comprise 75% of all forests in that region. This is presumed to be because of the soil which is a more important factor than the climate because this kind of forest is found on porous soil which drains well and is originated from the deterioration of laterite. This soil varies from red clay, loam that is rather reddish colored, or sand that is red or yellow depending upon the locality.

Generally speaking, deciduous dipterocarpus forests are quite similar throughout the country except in some cases where the physical and chemical qualities of the soil change and cause the varieties of trees that comprise the forests to change also, resulting in many sub-categories of this forest.

A noteworthy feature of this kind of forest is its spaciousness, somewhat like the sawanna forest. Trees are scattered and are medium or small in size and height and the undergrowth is tall grass or various bushes.

One more thing, in Thailand there are forest fires in this kind of forest nearly every year. This has helped to evolve a durability in the varieties of trees in this type of forest so that the deciduous dipterocarpus forests can withstand forest fires better than the varieties of trees that need more shade and moisture.

Trees that are found in the deciduous dipterocarpus forests include the phaluang (Dipterocarpus tuberculatus), hiang (Dipterocarpus obtusifolius), teng (Shorea obtusa), rang (Pentacme suavis var. siamensis), phayom (Shora talura), makhatae (Sindora siamensis), rokfa (Terminalia alatr), rak (Melanorrhoea usitata), manwanghuamalaengwan (Buchanania latifolia), krabok (Irvingia malayana), tenguam (Bridelia retusa), matung (Strychnos nux-blands), makhampom (Phyllanthus emblica), saemsan (Cassia garettiana), yopa (Morinda coreia), namthaeng (Randia tomentosa), makhang (Randia ugliginosa) and many species of san (Dillenia spp.).

The undergrowth is comprised of various species of grass, prong (Cycas immersa), tompeng (Phoenix acaulis), wild indigo (Indigofera elliptica), phalong (Memecylon edule), khaminmatri (Moghania lineata), tiger-tail grass (Moghania stricta), tutma grass (Desmodium velutinum), etc. Of the higher orders, there are the ko genus (Quercus) and the konam genus (Castanopsis)

which are interspersed among the others.

The deciduous dipterocarpus forests of the northeastern region include almost the same varieties of trees found in these forests in the other regions of Thailand. They only differ somewhat in some localities, as, for instance, if the soil is loamy, fertile and deep, the varieties of trees that grow will be much bigger, taller and more beautiful. Features not usually found in other regions include the teng (Shorea obtusa), rang (Pentacme suavis var. siamensis), phaluang (Dipterocarpus tuberculatus), hiang (Dipterocarpus obtusifolius), krat or sebaeng (Dipterocarpus intricatus) and khaleng (Dialium cochinchinense). Sometimes one encounters trees of the mixed deciduous forests, such as the phryk (Albizzia lebbek), pradu (Pterocarpus macrocarpus), daeng (Xylia kerrii), makhamoong (Afzelia xylocarpa), samothai (Terminalia chebula), matum (Aegle marmelos), etc. which makes the forest appear semi-mixed deciduous.

The common vegetation comprising the undergrowth of the forests in these regions includes phek grass (Arundinaria pusilla), a species of dwarf bamboo. This species of bamboo is a groundcover that looks very similar to grass, and it is an important obstacle to the propagation of the trees.

The deciduous dipterocarpus forests have great economic importance because most of the wood obtained from them is durable, and is therefore sought after for the construction of buildings, poles, railroad ties, electric poles, telegraph poles and bridges. It is used in heavy construction where strength and durability are desired, and as fuel which is demanded in large quantities by railroads and power plants every year.

Other important products obtained from this type forest are:

Dammar which is obtained from teng, rang and krabak trees;

Oil which is obtained from phaluang, hiang and krat trees and is used in the same way as oil from the yang tree;

Lacquer resin which is obtained from the rak tree (Melanorrhea usitata) and is used in making lacquerware;

Seeds such as saelongchai seed (Strychnos nux-vomica) which contain strichnin used in heart medicine; makmu seeds (Parinarium anamense) from which oil is extracted to use for mixing paint and for waterproofing; and krabok seeds (Irvingia malayana) which are eaten and used to extract oil for cooking, making soap, etc.

Other Types of Forests

In addition to the important kinds of forests already mentioned, there are many kinds of minor forests which do not cover much territory or have much economic importance but which

should be at least noted. These include:

Swamp Forests - This kind of forest is found in swampy or flooded areas of the central region, the southern region and the eastern side of the country. These forests can be sub-divided into two types: 1. fresh-water swamp forests; 2. brackish-water swamp forests.

In the fresh-water swamp forests the ground is muddy as in the salt-water swamp forests but they differ because of the fresh-water factor. During the rainy season water can be a meter or more deep in these forests. Trees found in these forests are usually the small leafed varieties such as thon (Albizzia procera), chumsaeng (Xanthophyllum glaucum), inthanin-lam (Lagerstroemia speciosa), thongkwao (Butea monosperma), tumnam (Mitragyna javanica var. microphylla), tumbung (Neonauclea sessilifolia), sanphinam (Eleocarpus hygrophilus), various species of chik (Barringtonia spp.), and kumnam (Crataeva nurvala).

Common bushes and vines are the khangmaew (Gmelina asiatica) and rotsukhon vine (Tetracera loureiri). There are no palms or bamboo. In some places grass and kok (Cyperus spp.) grow .

In the southern region the varieties of trees found in swamp forests differs somewhat. One can find kankrao (Fagraea fragrans), thia (Alstonia spathulata) and many species of sook (Saraca spp.). Various rattans also grow in these forests, but, generally speaking, these forests are much like the swamp forests of the central region.

Few lumber and forest products are obtained from these forests except for rattan and firewood. Kankrao wood has very good strength and durability but occurs in very limited quantities. The root of the thia tree is sought for making buoys, bottle corks, and sunhats because it is very light similar to cork used in foreign countries for making bottle stoppers.

The brackish-water swamp forests are scattered along the seacoast in the eastern region and southern region. The soil is loamy and highly acid but at this time they cover very little territory because they have been cleared for cultivation.

In this kind of forest the samet tree (Melaleuca leucadendron) is often the only tree. The undergrowth consists of coarse grass, sea prong (Acrostichum aureum), many species of kok (Cyperus spp.) and various species of tei (Pandanus spp.), etc. which cover the ground in clumps.

The samet tree is a medium-sized tree and its trunk is usually twisted. Therefore, it is used more for firewood and charcoal than for anything else. The bark is used for making torches and the leaves have medicinal properties; oil, commonly called "green oil" is extracted from them and is used for rubbing on aching parts of the body and bruises. It is also taken

internally to cure colic, bloat, reduce fever, etc.

Beach Forests - This type of forest is common in the sandy soil along the seashore. They are characterized by their spaciousness, many bushes, sea bung (Ipomaea pes-caprae), waithan grass (Ischaemum muticum), etc. which cover the sand. The varieties of trees in this type forest include both deciduous and evergreen growing intermingled. There are yinam (Pongamia pianata), krathing (Calophyllum inophyllum), sea pine (Casuarina equisetifolia), sea chik (Barringtonia asiatica), ket (Manilkara hexandra) and sea po (Hibiscus tiliaceus). In some places, where conditions are suitable, groves of sea pine grow which are very scenic and make fine resort areas.

The wood obtained from this type forest is primarily used for firewood and for making charcoal. Krathing wood and sea pine are used for making boat masts and fish-trap stakes to some extent, but these woods are scarce.

Forests are the great valuable treasures of Thailand and are very necessary to the well-being of her people. King Rama V recognized this fact and, for this reason, he established the Department of Forests in 1896 and it was then that a system was set in motion to manage, control, protect, improve and preserve the forests in an orderly manner.

TOTAL QUANTITIES AND VALUES OF WOOD WHICH WAS PERMITTED TO BE CUT IN THE YEARS 1947 - 1960

YEAR	MAHOGANY			YANG		
	QUANTITY (CUBIC METERS)	VALUE IN BAHTS PER CUBIC METER	TOTAL VALUE IN BAHTS	QUANTITY (CUBIC METERS)	VALUE IN BAHTS PER CUBIC METER	TOTAL VALUE IN BAHTS
1947	97,251	-	-	125,282	-	-
1948	238,838	-	-	180,454	-	-
1949	192,460	768	147,809,000	231,585	421	97,497,000
1950	244,762	937	229,342,000	213,079	439	93,542,000
1951	273,588	1,404	384,118,000	222,734	428	95,330,000
1952	261,306	1,121	292,924,000	253,476	448	113,557.000
1953	345,957	841	290,950,000	258,682	490	126,754,000
1954	358,878	864	310,080,000	291,035	497	144,644,000
1955	305,878	1,287	393,665,000	385,850	450	173,632,000
1956	200,295	1,150	230,339,000	340,044	420	142,818,000
1957	187,691	1,188	222,977,000	379,582	453	171,956,000
1958	178,802	1,125	201,152,000	418,326	403	168,585,000
1959	163,530	1,750	286,175,000	316,390	353	111,863,000
1960	153,644	2,350	361,110,000	320,833	399	128,012,000

TOTAL QUANTITIES AND VALUES FOR VARIOUS WOOD, FIREWOOD, CHARCOAL AND BAMBOO PURCHASED IN THE YEARS 1947 - 1960

YEAR	WOOD OTHER THAN MAHOGANY AND YANG		FIREWOOD		CHARCOAL		BAMBOO AND RATTAN	
	QUANTITY (CUBIC METERS)	VALUE (BAHTS)	QUANTITY (CUBIC METERS)	VALUE (BAHTS)	QUANTITY (CUBIC METERS)	VALUE (BAHTS)	QUANTITY (CANGS)	VALUE (BAHTS)
1947	478,728	-	1,279,064	-	661,995	-	-	-
1948	437,163	-	1,375,120	-	668,760	-	-	-
1949	865,375	234,369,000	1,415,269	66,518,000	635,825	82,021,000	23,450,000	77,243,000
1950	947,305	248,195,000	1,619,942	69,658,000	619,767	55,779,000	30,462,000	106,618,000
1951	938,333	315,141,000	2,010,234	88,450,000	768,449	85,298,000	22,374,000	101,561,000
1952	1,109,345	450,070,000	1,206,144	50,658,000	609,134	84,060,000	1,195,000	5,472,000
1953	1,009,345	491,188,000	1,206,628	69,948,000	930,358	128,458,000	1,783,000	7,133,000
1954	946,989	418,992,000	1,063,385	60,613,000	665,175	99,776,000	4,727,000	19,334,000
1955	920,716	376,185,000	1,176,644	67,657,000	585,320	87,798,000	8,973,000	26,919,000
1956	960,696	351,367,000	1,030,797	51,540,000	570,875	102,758,000	5,258,000	22,609,000
1957	1,019,623	429,361,000	1,204,385	54,197,000	505,157	88,402,000	7,950,000	34,822,000
1958	1,087,763	431,630,000	1,123,417	50,554,000	602,563	105,449,000	9,234,000	40,448,000
1959	733,420	332,311,000	1,147,106	51,620,000	628,046	113,048,000	-	-
1960	790,857	307,406,000	1,191,342	53,610,000	629,355	113,284,000	-	-

a. From the book of agricultural statistics of Thailand, Dept. of Agricultural Economy, Ministry of Agriculture.
b. Does not include statistics for other forest products.

3. Marine Life

1. The Importance of Fishing

Fish is the basic food of most of the people of Thailand. In the central part of the country, especially, there has long been used an idiom which states "eat rice and eat fish" but which means simply "to eat". Even at the present time fish is still an important part of the meat diet and it is inexpensive and nutritious, as are rice and fruit which are vegetable. Almost every Thai household relies upon the harvest of the water for their daily food; therefore fishing in Thailand is considered as a basic industry second only to agriculture in quantity and value as a source of food. Fishing is the occupation of a large part of the population and is a goodly source of income for the government.

2. Places Where Fish Are Caught

Salt-Water Fishing Grounds - The places where salt-water fish are caught in Thailand include about three-fourths of the Gulf of Siam and the long coastal area bordering on the eastern Indian Ocean from Burma to Malaysia, a distance of about 2,800 kilometers. The fishing grounds in the Gulf of Siam extend from Prachuapkhirikhan Province to the tip of Trat Province, about 350 kilometers wide, and from the sandbar at the mouth of the Chaophraya River to the end of the border at the Takbai River, about 800 kilometers long. In these areas fishermen roam in large numbers and harvest a good take to be sold on the home market and to be exported. The Gulf of Siam is shallow and thus its entire area is suitable for fish but most fishing is done close to the seacoast as is also the case along the western coast of the Malaysian Peninsula. Not much deep water fishing far from the coast is yet done.

Fresh-Water Fishing Grounds - Fresh-water fish are commonly caught along all the large rivers in the central section of the country, an area which has a large number of rivers and canals as well as lagoons, swamps and lakes. These streams and large deposits of water constitute a source and home for fish.

3. Fresh-Water Fish

There are many species and numbers of fresh-water fish in Thailand. Most are edible and noted for their tastiness. Some species are unique to Thailand and some are similar to those well-known from China and India all the way to the Malaysian Peninsula. Some species have strange habits that make

them known round the world, such as the climbing fish, fighting fish, tiger fish and many other species which have special breathing organs that permit them to breathe air thus helping them to endure dry spells. Some of these species are the serpent-head fish, the climbing fish and one species in the cap fish family.

Fresh-water fish of which there are many species and which exist in large numbers include the dace, takook, milky fish, bua, soi, sa, etc. which are in the Cyprinidae family. Some species are very small, only four to five centimeters long at maturity. The most important genera are Puntius (dace and soi), Osteochilus (phrom), Labiobarbus (sa, soinokkhao), Cyclocheilichthys (takook, namlang), Cirrhina (milky fish), Hampala (krasnp), Thynnichthys (kletthi), Luciosoma (ao), Culter (thongphlu) and Catlocarpia (giant carp). Almost all these fish are caught by hand equipment and are sold in markets throughout the country.

The scaleless fish group includes the kot, tuk, sheat fish, khao, khayaeng, suai, etc. There are seven families of these fish in Thailand comprising many species. Some species are very different. They are plentiful, make delicious eating and are a common part of the diet. As for the differences in size, many species are not over 10 centimeters long, but in the Mekong River basin there is a species of scaleless fish with a body as large as the common cow that attains lengths up to three meters; this fish is called "buk". In the group of scaleless fish in Thailand there are many species in different genera. An interesting characteristic of these fish is that they carry their eggs in their mouths. As soon as the female lays the eggs, which are relatively few in number but large in size, averaging up to 1.5 centimeters, the male immediately takes them into his mouth. It keeps the eggs in its mouth during the entire incubation period. Usually the young fish stay in the father's mouth until the "food pouch" is emptied of its contents and the young are able to swim themselves. During the time that the male is performing this duty, about six weeks or even longer, it does not eat anything and so becomes very thin.

Serpent-head fish, such as the chon, chadoo, krasong, kalon, etc. of the family Aphicephalidae, have long bodies, large heads, wide mouths, and long dorsal and bottom fins. They are sluggish fish, live in still, muddy waters, and can burrow into holes where they stay for relatively long periods of time. In Thailand there are six species, two of which grow up to a meter long. Many of these fish are caught and they are part of the basic diet in nearly every locality. As this species of fish can live for many hours out of water, they can be bought in the market while still alive. The meat of the chon (Ophicepalus striatus), which is a common fish, is eaten both fresh and dried.

The family Osphronemidae includes the rhinoceros fish, the pilot fish, the gouramy, etc. The rhinoceros fish has a large body as its name implies but does not occur in large numbers. Along with many other species of the Trichogaster genus, there is the pilot fish which is the best species of this genus. It is dried for eating and is also exported. These fish inhabit still waters, therefore they are suitable for stocking ponds.

Some other fresh-water fish that are commonly sold in the markets are the fan-tailed fish (Notopterus) of which there are two species that are called krai and salat locally; the climbing fish (Anabas); the large-bodied eel (Pisodonophis); the Brahmin-bearded fish (Polynemus); the half-fish, which is commonly called the dog-tongue and the buffalo tongue (Cynoglossus and Synaptura); and many species of the goby fish, including the largest species of this group which are common throughout the world.

In addition, there are two species of valuable fish that migrate from the sea into the river mouths for a time. One is the perch (Lates) some of which weigh 20 kilograms or more and are said to be the best fish. Another species is the shad which are a large fish in the green-backed fish family. This species established the fishing industry on the Chaophraya River at Bangkok and other places because many people like the meat and roe of these fish.

4. Sea Fish

The seacoast of Thailand is the home of great numbers of marine life. Some species are among the best and are expensive. Of the tropical sea fish phylum, some species migrate long distances but some stray into the waters of various countries and stay for a year or so at a time. Other species regularly migrate from one locality to another locality depending upon the monsoons or perhaps a combination of the monsoons and the seasons. Some species stay along the seacoast or at the bottom of the sea and if they move at all, they don't travel far. The economically important fish are in the various groups mentioned hereafter:

The green-backed fish, which is found throughout the world, comprises many genera and species. Some species occur in large numbers and are a common source of food eaten by all Thais. Examples are the green-backed fish and okkaen (Sardinella), lukkluai (Dussumieria), phut, lek, taluak (Ilisha), khook (Anodontostoma) and daplao (Chirocentrus).

Regarding another interesting group of fish which is found in large numbers and is economically important, there is the fish family Engraulidae (hangkai, kei, mongkroi and nga).

Of special interest is the maew (Eagraulis) which has cat-like features in that its upper jaw has extensions that look like "whiskers". These fish come in along the seacoast to feed at intervals. Some species are large. All of the fish that have been mentioned have greater potential than the uses presently made of them. The small kluai, the riaw and the sai have silver stripes along their sides and are sometimes called kei, mali and saitan (Stolephorus). There are many species of these fish and they are quite numerous. These fish were imported into Thailand. In a pickled form they are called "pladaeng" and it is this same fish that fishermen catch to make fish sauce which is very popular and well-known. Many species of the mackerel family, which is found in warm waters and in the tropical regions all over the world, are found in the Gulf of Siam. Some of the important species are the inthri (Scomberomorus), which is the same as the lang, and the scomber (Rastrelliger). The scomber is said to be the most valuable of the Thai salt-water fish.

Other species of salt-water fish which are regularly caught and sold in the markets are the krabok (Mugil), of which there are many species and large numbers; namdokmai or sak (Sphyraena); kurao (Eleutheronema), some of which attain a length of a meter or more; butterfish (Stromateus); many species of the drum fish in the Sciaenidae family; ma; takkae; grouper (Epinephelus); and other fish of the bass and perch families. There are many species of sikun (Caranx), which is called locally phon, hangkiw, hangkhaeng, etc. Sometimes large numbers of these fish are caught. Flat fish such as the linma (Synaptura, Cynoglossus, etc.) are also found. In addition, there are scaleless species which are called kot and thukang (Tachysurus) including the shark, ray, saw-fish and many hundreds of other species.

5. Shellfish, Shrimp and Crabs

There are many species of shellfish in Thailand and they are very important economically.

The various shellfish which are edible and that can be said to be important at present are very few. Shellfish that can be found everywhere include the mollusk (Mytilus) and mussel (Modiola) both of which can be found sticking together in thick clusters along the seashore. They are used as food for humans and pets. In many places at the mouths of rivers where the fresh-water meets the sea-water and somewhat reduces the salinity of the sea-water, oysters (Ostrea) can be found that are delicious when they are of the right size. Therefore, so many people want them that when there aren't enough to meet the demand, oyster divers also market the over-sized oysters which are rather tough.

Beautiful pearls can be found in many species of salt-water and fresh-water shellfish but they are of insufficient size and weight. Many species of shellfish have white pearls or shells that are beautiful enough to make buttons, inlaid wood, and other things. The oyster shell (Placuna), which the Philippinos used instead of mirrors to decorate windows, is also found in Thai waters but so far they have not been put to any use.

There are many species of cuttle-fish which are locally called mukhom, mukkluai, mukkradong and muksai. They are usually caught by ordinary hand equipment in sufficient numbers to eat locally and to send to other markets for sale.

Barnacles are eaten in some localities along the sea-coast and in at least one place in the southeast. Barnacles are in the shellfish group that are a danger to submerged wood. In some localities of warm water tropical regions they are raised for food.

Crabs are found just about everywhere along the seacoast. There are the swimming crab, mud crab, hermit crab, land crab, etc. The large delicious salt-water crab called the sea-crab (Scylla serrata) is much sought after and is sold in the markets every day with its large claws tied. Another species of swimming crab that is much used for food is the ma (Portunus pelagicus). The saem crab can be salted down and shipped to distant markets.

Shrimp are found in many varieties and in great numbers all along the seashore. In river mouths there are more species and greater numbers of shrimp than any other marine life in the same group. Species of shrimp which are eaten in both fresh and dried form include shrimp in the Peneus genus (takhep, hangdok, pra), the Palaemon genus (maewat, huakhaeng), Crangon genus (ditkhan) etc. Khoei are the smallest shrimp, only about 1 - 2 centimeters long. They are widely caught and used to make the shrimp paste which is so well-known. As for fresh-water resources, in addition to fish, there is the tooth-clawed shrimp (Macrobrachium) which is caught in large numbers and is larger and better tasting than the same shrimp found in the northern part of the country.

One more thing, at this time there are shrimp farmers who raise large numbers of shrimp for export to other countries.

6. Reptiles and Frogs

The most valuable creature of this group is the green sea-turtle (Chelonia mydas) which lays its eggs along the sandy beaches of various islands. These eggs are much sought after and the right to take and sell them is granted by the government annually to persons who pay the tax. In Thai waters there is also the beaked turtle (Eretmochelys imbricata), another species

that has scales which can be sold.

There are many frogs in Thailand. Some species are large and are eaten; therefore they can be seen on display in the markets of Bangkok and other cities during the rainy season.

Lizards live in the rivers and swamps. Their skins are sold as a product to a limited degree and their meat and eggs are eaten.

There are two species of crocodiles which are common in both fresh-water and salt-water. Their hides are valuable for making items of beauty and durability. In addition to these, there is a species of alligator or long nosed crocodile.

7. Fresh-Water Fishing

In fishing in the rivers, canals, pools, swamps and lakes of Thailand, the type of equipment used depends upon the terrain and the kind of fish being caught. Common fishing equipment includes weirs, various types of seines, cast nets, large dip nets, boat nets, small dip nets, etc.; various types of woven bamboo equipment; as well as fishhooks, spears and tridents. At places where small narrow streams flow off from pools, swamps and lakes various blocks are placed in the stream, such as weirs and dip nets. As soon as the soi get to be big enough to move against the current to higher locations, people can be seen standing along the banks of streams or on tiny islands in the streams in almost every hamlet using small fine-meshed dip nets to catch millions of fish. These fish are eaten both fresh and dried and in some localities where there is much fishing and great numbers of fish are caught, large cauldrons are used right on the banks of the streams to cook the fish to get the oil and to make fish sauce.

Fish are sold regularly in the marketplaces of the localities and sometimes are sent into Bangkok or to other fish-selling centers. Sometimes large rice boats are nearly filled with water and such fish as serpent-heads, climbing fish, feather-backs, caps, etc. which are then transported to distant markets. Most of the people like to eat fish.

8. Salt-Water Fishing

Fishing is done all along Thailand's long seacoast. There are thousands of fishermen and they catch many edible fish. Some places consume their entire catches in a given locality but other places send fish to be sold in Bangkok and the other provinces. Some fish is also exported to foreign countries.

One important method used in salt-water fishing is to take stakes, in both deep and shallow water, and drive them into

the sea bottom so that they form a tight circular enclosure called "lukpo". Usually these enclosures have diameters of about 56 meters and at the opening two wings extend out in opposite directions about 100 meters. From the center of one wing to the center of the other wing it is about 120 meters so that the fish are herded into the trap opening. Many fish are caught this way each year. In some localities especially suitable for fishing these traps are set down so close together that very few fish can get by. Some traps are set up in water as much as 18 meters deep and they have to be made strong enough to withstand the pressure of the waves, also. Large traps distant from the shore cost tens of thousands of bahts in labor and materials to construct. The success or failure of these traps hinges upon the numbers of scomber. Even though there might be many other varieties of fish that enter the traps and thus add to the success of the venture, there are few species that are found in numbers sufficient enough to compensate for the cost of the venture if the number of scomber taken is low.

Another important piece of equipment used in salt-water fishing or in the river mouths is the deep-water net trap (used at river mouths) which is set up along the channel where the current is strong. The current carries fish and shrimp past two funnel-shaped bamboo wings into the net which is tied between two posts. These nets can be found in large numbers along various sections of the Gulf of Siam. One of the more important places where these nets are used is at the mouth of the Chao-phraya River.

There are various sized seines, depending upon the size of the mesh, and the methods of using them also varies and these various methods are used everywhere along the seacoast. Some seines are cast from boats and then pulled into the boats; some are pulled up onto the shore; and some extend out from the sandy beaches or muddy banks that are almost nothing but beach at low tide. However, high tides bring in all kinds of marine creatures which are caught in the seines. Sometimes these seines stretch for long distances and they catch even the young fish and the scarcer fish. Split bamboo which is set up end to end and serves the same purpose as the seines, is also used a lot.

The hook and line method, with lines from 100 - 200 meters long and many hooks attached at intervals along the lines (about one meter apart), is also used to catch rays, sharks, and just about any other fish which is caught for food in the sea. Some of the hooks are baited but most of them are not barbed or baited. The lines are laid out to lure fish that are passing by.

Another important source of fish which is connected with the Gulf of Siam is the inland sea or as it is commonly called, Songkhla "Lake". Here there are shrimp that are very popular, therefore the catching of these shrimp is a big enter-

prise. The shrimp are caught by seines, nets, etc.

Some kinds of fishing equipment which is widely used in salt-water fishing in Japan, the United States and Western Europe, such as bag seines and vee-shaped seines, were first introduced to the Gulf of Siam about 1932 by foreigners who came secretly to fish in Thai waters along the seacoast and the islands.

Furthermore, there are some rather unusual methods used in various localities along the Gulf of Siam, such as high stilts that are attached to the feet of the fishermen so they can look for shrimp in marshy areas; and the use of flat boards, instead of boats, which are shoved along to collect crabs, cuttlefish, etc. along muddy stretches of the beach when the tide is out.

About 1942 someone brought rope traps from Japan to experiment with them and see whether they were good for catching fish along the seacoast. At the same time the fishermen began using motorized boats instead of sails because the former were faster and produced better results. Now motorboats have become necessary and important.

9. Controls On Fishing

Fishing, both in fresh-water and salt-water, is controlled by the government. Permission is needed to catch all forms of marine life and stores set their prices once annually. Special permission is needed to fish in certain streams and swamps and to hunt turtle eggs in the various islands, etc.; these licenses are auctioned off. As for equipment, some which is used to produce certain products is taxed by the units produced if these are exported.

The Department of Fishing is responsible for all aspects of fishing, including both fresh-water and salt-water fishing.

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CHAPTER 6

COMMUNICATIONS

People make use of communications to contact one another and as an important aid in transportation by land, sea, and air. When trains lacked telephone and telegraph communications they are unable to serve their customers as well as they can in modern times. So it is with sea travel and long distance flight. These might not have been possible at all and certainly would not be as rapid and safe without the use of modern communications. Transportation and communications are closely involved with one another and it might be convenient to place them both under the general heading of 'Communications.' Indeed, this involvement is suggested by the definition of the word given in the Thai Government Dictionary -- "Intercourse or contact."

In the field of Economics, communications is considered a production of service, along with banking, electricity, water supply, and other services; and it is a very important factor in the production, distribution, and consumption of goods. Communications is also important in national defense, government, trade, and travel. It must be emphasized that communications is a vital ingredient in the maintenance of today's standard of living, and its importance will increase in the future.

For each branch of the communications service, regulations governing construction, establishment, organization, method of operations, considerations of assets and expectations of profits must all be thoroughly thought out and made available in publications for study. Progress in every branch of communications is continuing without a break, but communications can serve the nation to full advantage only when all the branches and every region are organized and there is no over-lapping and repetition of work. A successful communications system cannot be created by piecemeal establishment of each branch. Policy and plans must be made first according to procedure and the needs and desires of the population. Most governments of the world clearly understand this and they are trying to set up communications systems, both internally and internationally, which are as well coordinated as possible. This can be seen from the establishment of various study groups in the U.N. and of international conventions

on communications problems. There is now in existence a committee for coordinating internal communications for every country.

I. Land Communications

In Thailand at present the two most important kinds of land communications are highways and railroads. Since highway communications in Thailand, as in other countries, preceded railroads, we will consider them first.

A. The Roads and Highways History relates that in the 4th and 3rd centuries B.C. Indian immigrants settled in what is now the central and southern regions of Thailand. Missionaries from the Emperor Asoka came to Nakhon Pathom to teach Buddhism, which is evidence that there were roads at that time. We also know from history that the Cambodians, who ruled the east and northeast regions in the 9th and 10th centuries A.D., built roads between the chief towns of that region and the Cambodian capital of Nakhon Thom. The Thais, who gradually migrated from China between the 11th and 14th centuries were already acquainted with the road building knowledge of the time. When they settled in modern Thailand, they made use of the road system already in existence, building and improving where necessary. A stone inscription of the 13th century refers to traveling merchants, use of horses and elephants for transportation over 'paths' and the construction of temples and homes in Sukhothai.

Road construction methods in ancient times were not the same as they are today. Roads then were chiefly for pedestrians, such draft animals as elephants, horses, donkeys, and mules, and the ox-carts were used at that time. Roads of that time generally follow original foot-paths and few were constructed according to plan as they are today. Road building was done by human and animal labor and the tools used were hoes, spades, and axes for clearing, leveling, and felling trees.

The first Thai roads were extensions of Cambodian roads. One of these was the Phra Ruang Road which, in ancient times, connected Kampaengpetch with Sukhothai and Muang Sawanaloke. In the beginning this road was a foot-path. Later it received additions and improvements.

King Mongkut, when he ascended the throne in 1851, made road construction an important feature in his program of rebuilding the country. When foreign residents in Bangkok complained to him that they liked to take rides in the evening for fresh air but that, as yet, there were no fit streets in the city, he determined to build several new streets. In 1862 the thoroughfare was built which foreigners to this day still call New Road.

By the time of the reign of King Chulalongkorn, road construction methods had made some progress over the ancient ways. Then before roads were laid down, the routes were surveyed. The first road built in the modern way was the Songkhla-Saiburi road, built in 1871. It was wide enough for two wagons to pass each other.

Responsibility for road construction in those days fell upon the local officials. Construction funds were not yet allocated from the national budget as they are now. Officials had to get the necessary funds from accounts of the local district or ask for public contributions. A labor force had to be conscripted from the district.

In 1929, because of the increasing importance of road construction, the government took over the direction of operations throughout the kingdom. Construction was made the responsibility of the Department of Public Works, which, subsequently, combined with other official bodies to become the Ministry of Public Works. But the tasks of actual construction, labor conscription, and fund raising remained the responsibility of the local leaders.

Later, in the regin of Rama VI, the government established the Department of Ways, under the Ministry of Communications, giving it complete responsibility for all land communications construction. At the time this responsibility referred only to roads. The Department of Ways was given a special budget for operations. Road construction has been an important concern of the state ever since.

After 1912, road construction, under the direction of the Department of Ways progressed rapidly. From 1871, the year in which the Songkhla-Saiburi road was completed by what we have called 'modern' methods, to 1915, under the supervision of the Department of Ways, about 775 kilometers of new road were built. Between 1919 and 1933 the introduction of railroads created an increasing need for connecting roads and about 1,046 additional kilometers were built.

Since 1934 special attention has been directed at the creation of a road system most advantageous to the economy, educational needs, government, and national defense.

During World War II, construction of roads for other than military purposes decreased somewhat. After the war construction grew rapidly in order to meet the growing needs of the motor vehicle which was slowly becoming an important means of transportation. The work of road building was greatly advanced by American aid in the form of money, technical knowledge, and machinery.

There are five types of roads in Thailand. The first of these are the National Highways, roads of prominant importance to the economy, government, and national defense. The second type is the Provincial Highways connecting the Province capitals with the important districts within the province. The third type is the 'Community Roads' which are minor roads within the districts. The fourth type is city streets or 'Urban Roads.' The fifth type is private roads built by individuals for commercial uses, etc.

At present Thailand has about 8,000 kilometers of completed roads and

another 6,000 under construction or planned. Most of the roads now in existence are surfaced with crushed rock; some are concrete, some gravel, and some dirt roads. The width varies, but the average is about five meters. Some are six, seven or eight meters wide, according to the demands of traffic.

Public notifications from the Department of Public Highways dated 17 and 22 November, 1960 set the maximum weight allowance for transport vehicles on the public highways according to the number of axles and wheels. For example, a two-axle, four-wheel vehicle is allowed no more than 6,000 kilograms of weight over the axle, or not more than 7,500 kilograms weight of the vehicle plus freight. The freight vehicles with the maximum weight allowance under the law are the semi-trailers with five axles and with the second and third and/or the fourth and fifth axles coupled and double-tired. The maximum weight allowed this type of vehicle is 7,200 kilograms over the axle or not more than 32,400 kilograms total weight of the vehicle plus freight. These rulings were made to insure that vehicles carried only such weight as the road surface can bear without deteriorating too quickly.

Bridges, which are an important part of the road system, used to be of wood. The size depended upon the size and condition of the rivers, canals, or streams over which the road was to pass. Later, iron was used instead of wood. In 1908 the first reinforced concrete bridge in Thailand was built -- the Chaloemlok (Wonder of the World) at Pratunam, Bangkok Province. Since then concrete bridges have been built in many places and have proved concenient and relatively inexpensive.

In some places there are as yet no bridges and ferries are used to transport passengers and vehicles across the water. This is the case on the Patani-Yala road where it crosses the Yala river and on the Uthai-Manorom road over the Chao Phraya. On the Khokkloi-Thanun-Phuket route motorized ferries are used for transportation from Phuket Island to the mainland. When the causeway, now under construction, between Phuket and the mainland is completed, there will be no further need of the ferries.

Travel would be more inconvenient and the accident rate higher if there were no road signs to tell distances and directions and to provide the passer-by with information about the condition of the roads and bridges. Now road signs are being put up generally in Thailand in accordance with recommendations of the Permanent International Association of Highway Affairs (Association International Permanent des Congres de la Route.) Thailand has been a member of this association since 1913.

The most important road in Thailand is the National Highway that runs from Bangkok through the central and northern provinces to the Burmese border at Maesai, Chiangrai Province. This road, the Phahonyothin, is 1,007 km. long. From this road are many branches leading to the central, northern, eastern, northeastern, and western regions. Some of the branch roads lead to the Laotian border in Nong Khai, Nakhon Phanom, and Phibun Mangsahan in Ubon Rachathani. The road to Cambodia runs through Aranyaprathet in Prachinburi.

The Sukhumwit road runs from Bangkok 400 km. east along the Gulf of Siam to Trat Province. There are plans to extend this road to the districts of Mairut and Khlongyai on the Cambodian border.

From Bangkok the Petkasem road runs through the southern provinces to Hadyai -- a distance of 1,260 km. From Hadyai three roads lead to the Malayan border at Sadao, Betong, and Waeng. Sections of both the Sukhumwit and the southern roads are still under construction. Distances on these three roads are measured from the Democracy Monument in Bangkok.

In the past, roads have been named after people of accomplishment or after things or ideas. For example, there is the 'Friendship Highway' which the U.S. helped build between Sayaburi and Nakhon Rachasima. For convenience some roads are simply named after the places they connect, such as the 'Ayuthya-Wangnoi Highway' or the 'Chantaburi-Thachalaep Road.' Bridges are named in much the same fashion.

In 1963 the Prime Minister issued an order (Government Gazette Vol. 80 No 57, p. 1463, 4 June, 1963) establishing a numerical system of road denotation, doing away with the name system from 1963 on. The basic system works as follows:

a.) North-south roads are odd-numbered from the Burmese border to the Indochina border.

b.) The east-west roads are even numbered, starting with number 2, from the Malayan border to the northern-most regions.

In detail:

1.) The San Kamphaeng-Chiangmai-Hod-Maesariang-Maehongson road -- No. 1.

2.) The Theun-Li-Lamphun-Chiangmai-Fang road -- 3.

3.) The Khlongphruan-Hadyai-Ratphumi-Pathalung- Trang-Huai Yod-Krabi-Phanga-Takuapa-Ranong-Chumpon-Prachuab Kirikhan- Petchburi-Rachburi-Nakhon Pathom-Bangkok-Saraburi-Lopburi-Khoh Samrong-Chainath-Nakhon Sawan-Kampaengpetch-Tak-Theun-Lampang-Chiangrai-Maesai road -- No. 5.

4.) The Sukhothai-Phrae-Nam-Wangphae road -- 7.

5.) The Nakhon Sawan-Taphan Hin- Phichiton-Changthong-Dansai road -- No 9.

6.) The border-Narathiwat-Patani-Klongae-Hadyai-Ratphumi-Phatlung-Nakhon Si Thamarat-Phunphin (Surat Thani)-Chumphon road -- 11.

7.) The Satun-Tamsao-Trang-Huai Yod-Thungsong-Nakhon Si Thamarat-Thaphae -- 13.

8.) The Betong-Yala-Patani -- 15.

9.) The Saraburi-Buachum-Wang Chomphu- Petchburi-Lomsak-Dansai-Leui -- 17.

10.) The Chonburi-Prachinburi-Nakhon Nayok-Sikiu-Chaiphumi-Chumpae-Leui-Chiang Khan road -- 19.

11.) The Saraburi-Nakhon Rachasima-Khokchik-Phon-Ban Phai-Khonkaen-Udon Thani-Nong Khai road -- 21.

12.) The Chantaburi-Kabintaburi-Nakhon Rachasima road -- 23.

13.) The Chongchom-Surinat-Thatum-Suwanaphumi-Kaset Wisai-Roi Et-Mahasankum-Kapsin-Sakon Nakhon road -- 25.

14.) The Det Udom-Ubon Rachathani-Amnatcharoen-Nukdahan-Nakhon Phanom road -- 27.

15.) The Aranyaprathet-Prakhonchai-Buriram-Sateuk raod -- 29.

16.) The Khao Phrawihan-Kantaralak-Si Saket road -- 31.

17.) The Tamsao-Khuan Niang road -- 2

18.) The Takuapa-Surat Thani road -- 4.

19.) The Phrachedi Sam Ong-Thong Phaphumi-Kanchonburi-Ban Pong-Bangkok-Samut Roprakan-Chonburi-Sathib-Rayong-Chantaburi-Trat-Mairut road -- 6.

20.) The Kanchonburi-Suphanburi-Ban Phachi-Hin Kong-Nakhon Nayok-Kanitburi-Aranyaprathet road -- 8.

21.) The Ban Mi- Khok Samrong-Buachum-Nong Buakhok-Nakhon Rachasima-Chokchai-Prakhonchai-Prasat-Kantaralak-Det Udon-Buntharik road -- 10.

22.) The Wang Chomphu-Chaiphumi-Bua Yai-Khokchik-Kaset Wisai road -- 12.

23.) The Kampaengpetch-Phichiton-Taphan Hin-Wang Chomphu-Petchbun-Manchakiri road -- 14.

24.) The Maesot-Tak-Sukhothai-Phitsanuloke-Lomsak-Chumphae-Khonkaen-Ban Phai-Mahasankum-Roi Et-Ubon Rachathani-Chong Mek road -- 16.

25.) The Thail-Leui-Udon Thani-Sakon Nakhon-Nakhon Phanom road -- 18.

26.) The Chiang Khan-Nong Khai-Nakhon Phanom road -- 20.

27.) The Lamphun-Lampang-Phrae road -- 22.

28.) The Maehongson-Pai-Maetaeng road -- 24.

29.) The Fang-Chiangrai road -- 26.

30.) The Had Yai-Songkhla road -- 105.

31.) The Trang-Kantang road -- 205.

32.) The Samut Songkhram Pangphae-Nakhon Pathom-Don Chedi road -- 305.

33.) The Pon Prachum-Chomklao-Wongwian-Thaphra-Phra Ram-Rangsit road -- 405.

34.) The Nonthaburi-Chacheung Sao-Phanat Nikhom road -- 505.

35.) The Wang Noi-Ayuthya-Angthong-Singhaburi-Chainat road -- 605.

36.) The Maechan-Chiang Saen road -- 705.

37.) The Bang Pakong-Chacheung Sao-Phanom Sangkham road -- 106.

38.) The Si Sachanalai-Utradit road -- 107.

39.) The Rong Kwang-Ngao road -- 207.

40.) The Takhli-Khaosab-Saklek road -- 109.

41.) The Nangrong-Buriram road -- 110.

42.) The Raman-Yala-Yaha-Naket road -- 111.

43.) The Pak Phang-Nakhon Si thamarat road -- 211.

44.) The Yasothon-Amnatcharoen-Khanarat road -- 116.

45.) The Thatunaweng-Sakon Nakhon-Thatu Phanom road -- 118.

46.) The Pak Chong-Khao Yai road --121.

The highways now in existence serve as a unifying communications system for the provinces and districts throughout the country. The government has plans to make some of the roads that are now open to traffic and some that are still in the planning stage into international highways under the International Highways Program of the U.N. Committee on Asian Economics. This program calls for the linking together of various countries in the Far East and the Middle East with a great international highway system stretching from Saigon to Istanbul, there merging with the European system.

In 1960 the Department of National Highways and the Police Department cooperated in creating a Highway Patrol to enforce traffic regulations throughout the country.

B. Railroads When King Chulalongkorn ascended the throne in 1868, government and commercial communications between Bangkok and the rest of the country were by road and water only. Roads were the only land communication lines and transportation was by elephant, horse, mule, donkey, ox, bullock and buffalo cart. The king was determined to modernize the communications systems and saw clearly that railroads would be an important means of transportation in the future.

In 1855 during the reign of King Mongkut, Queen Victoria had sent a small replica of an English train of the time as a gift to the king. This model is now in the National Museum. In 1871 the king paid state visits to Malaya and India where railroads were already in existence. At the same time the Burmese government was surveying a rail route to the Chinese border.

On 13 September, 1886, the Paknam Railroad Company was granted a fifty year license to build and operate a 21 km. rail line from Bangkok (Hua Lampong) to Somut Prakan. This company began operations in 1893. In 1933, when the period of time allowed by the license expired, the government bought the line and operated it until 1958. Service on the line was discontinued on 1 January 1959 to help relieve rail congestion in Bangkok and because highways between Bangkok and Somut Prakan were able to handle all the traffic.

In 1887 the farsighted monarch invited British experts to survey a rail route from Bangkok to Chiangmai with branches to the important northern and northeastern provinces.

A Royal Proclamation of 1 March 1890 ordered the construction of a railroad from Bangkok to Nakhon Rachasima and British contractors were granted a mandate to undertake the construction. The royal ceremonies on the propitious day for beginning the project were held on 9 March 1891. By 1896 a 71 km. segment of the road had been completed between Bangkok and Nakhon Si Ayuthya and on 26 March 1896 the king and queen formally dedicated the route. This date marks the beginning of Thailand's railroads.

1. Railroads in the Northeast.

The Bangkok-Ayuthya line was extended to its planned limits and opened to traffic in 1900. This 264 km. long railroad was commonly called the "Khorat Line' but its correct name was the 'Northeast Rail Line.' At the Chira junction station, two km. beyond Nakhon Rachasima, the line divides into two branches. One branch, completed in 1930, runs east through several provinces to Ubon Rachathani -- a distance of 575 km. from Bangkok's Hua Lampong station. The other branch leads from the Chira junction station to Nong Khai on the Mekhong river. It is 624 km. from Hua Lampong station to Nong Khai.

There are plans to add more branches to the Northeast Rail Line in this area. Some new building is already completed.

The Northern Rail Line.

The Northern Rail Line branches off from the Northeast Line 90 km.

north of Hua Lampong station and leads through the central region to Chiangmai. Work on the railroad between Ayuthya and Ban Pachi junction, where the Northern Rail Line begins, was completed in 1896-97. In time the line was completed and opened for traffic. In 1929 the first train made the 751 km. trip from Bangkok to Chiangmai. As with the Northeast Line, additions to join important districts and towns in the northern and central regions have been planned and some are completed or nearing completion.

2. The Southern Rail Line.

After establishing the Northeastern Rail Line, King Chulalongkorn ordered the building of a railroad from Thonburi at Bangkok Noi to Petchburi. It was rightly called the Southern Rail Line, though many called it the Western Railroad because it lay to the west of the Chao Phraya river. The land for this railroad was obtained through a royal subscription for funds in 1899. The completed 152 km. stretch of track from Thonburi to Petchburi was dedicated in a royal ceremony on 19 June 1903. Since then extension of the line has proceded step by step through the important towns and districts along the seacoast to Padang Besar on the Thai-Malayan border. In 1919 the whole route from Thonburi to Padang Besar was finished. In the same year a treaty was signed arranging for cooperation between Thai and Malayan railways. As a result it was possible to travel by rail from Bangkok to Singapore. The distance from Thonburi station to Padang Besar is 975 km. Plans were made to extend branches from the Southern Rail Line thus bringing the advantages of rail communications to the inland districts. Many of these branches have already been built but some are still under construction.

An important branch is the one at Had Yai, 920 km. from Thonburi, which runs south to the Malayan border at Sungai Ko-lok, 1.144 km. from Thonburi. Completed in 1921, this line is the second rail link with Malaya.

3. The Maeklong Rail Line.

This railroad is a part of the system connecting Bangkok and Thonburi with two important towns on the Gulf of Siam. The two towns are Somut Sakhon, situated at the mouth of the Thachin river, and Somut Songkhram at the mouth of the Maeklong. In the beginning, the Maeklong Railroad Co. Ltd. was a private company operating like the Paknam Company mentioned above. The railroads belonging to these two companies were called 'private railroads' to differentiate them from the state railroads which we have been discussing. The Maeklong Railroad Co. Ltd. was licensed to operate the 22 km. Khlongsan-Mahachailline on 17 May 1901. The company also operated tram-car lines and, on 15 August 1905, was licensed to operate the Thachin-Maeklong line. In 1942 and 1945, when these licenses expired, the government took over the railroads. Today they are a part of the state-operated Maeklong Line. In January 1961, the government moved the terminal station from Pak Khlongsan to Wong Wianyai Station, Thonburi, for the greater convenience of passengers in Bangkok.

4. The Eastern Rail Line.

In 1905 work was begun on the Eastern Railroad. The whole length of the road from Bangkok to Aranyaprathet was completed in 1926, and in 1955 Thai and Cambodian cooperation was achieved in rail operations between the two countries. In 1953 a branch of the Eastern Line was extended to Sinkha and the Thai port of Khlong Teui. There are plans to add branches connecting the various districts and towns on the east coast of the Gulf of Siam also.

5. Private Railroads.

Besides the state railroads and the private railroads already mentioned, there are several other private concerns operating railroads by government license. Most of these railroads exist to serve particular commercial industries. The Ban Buathong Railroad Co. Ltd, formed in 1922 from a merger of two other private companies, operated about 29 km. of track from Bang Yikhan, Thonburi to Ban Buathong, Nontaburi until it discontinued service in 1952. The Tha Rua Railroad Co. Ltd. transported freight and passengers between Tha Rua Station, Phra Nakhon Si Ayuthya and Phraphutabat Station, Saraburi from 12 May 1931. This company had a twenty year license but discontinued service in 1942. Some other private lines still exist, serving mainly the lumber and mining industries.

II. Water Communications

When our forefathers lived in the valleys of the Yellow and Yangtse Rivers, they doubtless had a thorough understanding of water communications. When the generations that made the migration to what is now Thailand saw the many rivers, they were satisfied to settle here permanently. And since our ancestors were used to water travel, they made their first settlements on the banks of the rivers. Eventually great cities grew from these riverside settlements. We think of such cities as Sukhothai on the Yom, Ayuthya on the Chao Phraya, Rachaburi on the Maeklong, and Chacheung Sao on the Bang Pakong. Later, when Bangkok was founded, it was founded by a river -- the Chao Phraya -- just as the ancient cities were. As time went on, canals were dug joining rivers with rivers and with the sea, always according to the needs and desires of the population.

We find in The History of Ayuthya by Prince Boroman Chitachinarot that:

> "In Sokraj 860, the year of the horse, the tenth year of the decade, (1448) King Ramathibodi I ordered that annals of victories and Royal Acts be kept. At that time, where the Samrong and Thabnang canals met near the shallow and congested mouth of the Chao Phraya, two gold-alloy statues of dieties were placed as propitiatroy offerings and were later enshrined at Muang Phra pradaeng."

Accounts of the history of Bangkok by various authorities refer to

the building of such canals as the cross-town Khleuankhan canal in the reign of King Rama II. King Rama III gave detailed orders to "Prince Si Phiphataratanarachakosa to take charge of the construction of a new canal connecting with the Phra Khanong canal -- a length of 337 Sen, 19 Wa /about 13-1/2 km./ at a cost of 63 Chang of silver /about 83.79 lbs./" He further ordered that "the Bang Khunthian canal be extended to the mouth of the river at a cost of not more than 827 Chang, 18 Tamleung of silver /about 1100 lbs./ and that the Sunakhahon canal be deepened to impede the current at a cost of 102 Chang of silver /about 135.66 lbs./" Also mentioned in historical accounts are the Phadong Krungkasem, Chedi Bucha, Mahasawat, Phasi Charoen, Damnoen Saduak, and Hua Lamphong canals which King Chulalongkorn had built.

Canals still play an important part in the communications system of Thailand. General Prince Wongsa Phraphut has given a thorough account of "the canals, old and new, in the cities and chief districts of Siam" in his History of the Ministry of Agriculture, first printed in 1910.

In 1899, to maintain the canals as a public convenience and to insure a plentiful supply of water for the land, King Chulalongkorn created the Department of Canals. In 1912 the Department of Canals was made a part of the Department of Ways under the Ministry of Public Works. Irrigation canals remain the responsibility of the Ministry of Agriculture.

The greater part of the canals are located in the central region of the country because there the soil is soft and digging is easier. Canals serve the people in much the same way as highways do. They are used for transporting passengers and freight from point to point and from production center to market.

In the central region three rivers -- The Chao Phraya, Thachin, and Maeklong -- are like great water highways. The myriad canals may be compared to the tributary roads and branch roads, and trails.

The Chao Phraya, from its beginning at the confluence of the Bing and Nan Rivers, flows south 260 km. to the Gulf of Siam.

The Thachin is 300 km. long from its source at Chainat to its mouth.

The Maeklong is 520 km. long from its source to the northwest to its mouth in the Gulf of Siam.

In the north, the four tributaries of the Chao Phraya have long been important waterways. They are more useful in the rainy season than in the dry season, when their level drops a good deal. The four rivers are:

The Bing River ---------- 600 km.
The Wang River ----------300 km.
The Yom River ----------550 km.
The Nan River ----------740 km.

The northeastern region is a high plateau. Even so, there are several

rivers in this section -- The Chi, Mun, and others -- but generally they are too shallow for much water traffic. People in this section have to be satisfied with road and rail transportation. Only those who live on the Mekhong River make extensive use of water travel.

In the eastern region of Bang Pakong, Rayong, and Chantaburi Rivers are navigable. The Bang Pakong, which empties into the Gulf of Siam, is 230 km. long. The Rayong flows 60 km. from the north to its mouth in the Gulf of Siam. The Chantaburi River, also flowing from the north, is about 100 km. long from source to mouth.

Water travel in the south is mainly by the coastal waters of the Gulf of Siam and the Indian Ocean. The Petchburi, Thabi, Patani, and other streams are used by inland people as outlets to the coast.

Rivers, streams, and canals are referred to as 'internal waterways.' The rivers and canals are navigable to varying degrees and lengths of time. There are about 1,650 km. of waterways in the central and part of the northern regions that are navigable throughout the year, having always a depth of at least one meter. When the current water conservation plans and programs are in full operation, the usefulness of the waterways will be greatly improved.

In all, Thailand has about 2,420 km. of seacoast. The coastal districts have, in the sea, a ready means of communication with one another and with Bangkok. Sea communications are as important to Thailand as any of the other kinds. The sea is a doorway leading to international contacts. too.

There is as yet no water link between the Indian Ocean coast and the Gulf of Siam coast except, by ship, arround the Malayan peninsula. If there were a canal at some place across the isthmus it would be a great saving and benefit to shipping. An isthmus canal has been under consideration since the time of King Mongkut. Even now the government is investigating the problems and possibilities involved.

III. Air Communications

A. Internal. Aircraft first appeared in Thailand in the reign of King Rama VI. In the latter part of January 1910, Juan Denfon, a European pilot, landed an airplane on the Royal Parade Grounds at Pathumwan. He gave a demonstration before the king and General, Prince Boromwong; the Army commander and other Army officers rode up in the craft. After the demonstration the plane was purchased by the government for training purposes. In 1911, the Defense Ministry sent three army officers to France for flight training. When they returned, they brought back eight planes. Thus began the Army Air Force. The Royal Parade Grounds became the first air base and hangars were built there.

In 1914 the Air Department was formed and its headquarters were at Don Muang, today the country's largest airport. On 23 January 1920 the

Department initiated Thailand's first scheduled commercial flights between Nakhon Rachasima and Ubon Rachathani.

In 1929 King Prajadhipok sent Leuan Phonsaphon, already a skilled pilot, to the U.S. for further training. When Phonsaphon completed his training, he flew back in his own plane, a World War I type craft with a 90 hp Curtis engine. The airplane was named "Miss Siam.' In 1931, Phonsaphon made a solo flight to China and returned with the encouragement of those who were interested in Siamese-Chinese cooperation. This was the first air link between China and Thailand.

In the same year the Ministry of Commerce and Communications formed the Air Transport Co., Ltd. called in English the Aerial Transport Company of Siam Ltd. This company organized commercial flights within Thailand, using Don Muang as the principle airport. The company also provided automobile transportation between Bangkok and the Don Muang Airport for the convenience of its passengers. The company also offered chartered flight service. In 1933 Leuan Phonsaphon, now deputy-chief of pilots, flew a chartered aircraft from Bangkok to Hong Kong. In 1939 the company changed its name to the Transport Co. Ltd.

During World War II business fell off greatly and, after the war, the company discontinued its air service.

Internal air service began again in Thailand with the formation by the government of the Siamese Airways Co Ltd. in 1947. This company provided the only air freight and passenger service in Thailand until 1951. In 1960 the Siamese Airways Co. Ltd. became the Thai Airway Co. Ltd. It provides air service to 13 cities including Chiangmai, Maehongson, Udon Thani, Nakhon Phanom, Phuket, Songkhla, Maesot, and Maesariang. The total air route distance is 2,400 km. The company used to have De Havilland, Fairchild, and Bonanza planes, but now it uses DC-3s, C-47s and Dakota-7s.

In 1960 the company served 39,549 passengers, which was operating at about 58% of capacity. Freight handling was about 59% of capacity.

B. Internation Air Communications. After the termination of World War II, the government, observing that the air communications system in Thailand was small, decided to form an international airways company, which, it was felt, would be a benefit to the people and a spur to the economy. It was decided to establish the company in cooperation with two foreign air lines. The government was to buy 25% of the shares, the Thai people 26% and the foreign companies, 49%. Thus Thailand would hold 51% and the foreign companies, 49% of the stock. The first of the companies involved was the Pacific Overseas Airlines which became the Pacific Overseas Airlines (SIAM) Ltd. or POAS. The other company was the Trans-Asiatic Airlines which became the Trans-Asiatic Airlines (SIAM) Ltd. or TAAS. TAAS soon discontinued service and POAS merged with the Siamese Airway Co Ltd. to become the Thai Airway Co. Ltd.

The Thai Airways Co Ltd. provided internal and international freight

and passenger service until, in 1959, it became associated with the Scandinavian Airways System (SAS). It is now called the Thai Airways International Ltd. (TAI). The new company operates the same international routes and under the same conditions as the old Thai Airways Co.

IV. Postal Communications

In ancient times postal service, the sending of dispatches, etc. was primarily limited to governmental use. Some merchants may have communicated by letters but they were certainly a minority.

Official government notices, messages, and dispatches were sent by runners or by horse or cart. If the message was especially important an official would accompany it and was responsible for its delivery to the right people. Messages to foreign governments were generally sent along with merchant caravans bound for that country. Royal messages to foreign heads of state were carried by ambassadors. If merchants or other private persons wrote letters, they sent them by trusted servants. At that time there was no professional postal service.

During the reign of King Mongkut, letter writing was becoming more extensive. The nations which had established consulates in Thailand provided their own postal service for their nationals. In 1867, the British consulate arranged postal service between Thailand and Singapore. These foreign systems were to be helpful when Thailand established its own service.

A. Internal Postal Communications. In 1860 Prince Samoechairaj wrote King Chulalongkorn advising the establishment of a Thai postal service along the lines of foreign systems which he had observed. The letter was later published.

The king was in full agreement and ordered a postal service established in 1883. An office building near the Chao Phraya River in Bangkok was built to house the Postal Department. The building has since been used as a training school for postal and telegraph workers and radio technicians. Then it was Thailand's first post office. The department remained in the building until 1927 when it was moved to new quarters at the one-time British Embassy compound on Charoenkrung Road. The old building was torn down and a new structure, housing the Department, has been in use ever since its completion in 1939.

When the Postal Department was first established, European experts directed the operations and trained local workers. A Postal Training School was opened in 1929. When sufficient local workers had been trained, the hiring of Europeans was no longer necessary.

In 1898 the Minister of Public Works suggested that since the work of both the Postal Department and the Telegraphic Department was within the general area of communications, the two departments ought to be joined for greater efficiency. The king agreed and the Department of Mail and Telegraph

Service was created.

The postal service expanded according to Prince Samoechairaj's advice that at first the system be firmly established in Bangkok, and then little by little extended to the rest of the country, that small local post offices be built where needed, postal regulations drawn up, postage stamps printed, and such items as mail boxes provided.

By 1905 after the establishing of the Bangkok system, service was extended to Somut Prakhan and Phra Pradaeng, and from then on, as occasion permitted.

In 1905 an arrangement was made with the Department of Railroads whereby post offices were set up at the train depots, starting first with Bangkok and, in 1906, Nakhon Rachasima, and finally at every station. In 1935, the first mail cars were added to express trains.

In 1933 in order to rapidly improve mail service, the Department authorized private persons to establish postal service offices called "Private Licensed Post Offices.' There are now a considerable number of these, both in Bangkok and the provinces. But, for the most part, their operations are local and limited to the smaller towns within provinces. Most of them have had a short life expectancy, owing to the competition. Consequently, in 1936 the Department organized postal offices in the districts called "Licensed District Post Offices.' These offices have been a great help in improving postal service and saving the government money. The Department hopes to extend this system.

Postal service is of such importance to the public that regulations and procedure are necessary to enable the people to make the system work. In 1885, two years after the founding of the postal service, the government enacted a law called the 'Royal Thai Postal Act.' This law was superceded by another law which remained in effect until 1934. It, in turn, was replaced by the present law, 'The Royal Postal Act of 1934.'

B. International Postal Communications In 1885, the year of the first postal law, Thailand became a member of the World Postal Organization and sent representatives to the meetings to duscuss problems connected with coordinating international postal conventions. Postal service is not only a matter of handling and delivering letters. There are also postcards, money orders, goods, COD parcels, and even braille reading matter for the blind. In both internal and external postal service the Department of Mail and Telegraph Service operates according to World Postal Conventions.

V. Telegraph Communications

The first attempt to establish a telegraph in Thailand occurred in the reign of King Mongkut. A certain Englishman received Royal permission to establish a telegraph line, but he was unable to complete the task. Finally, under King Chulalongkorn, the government decided to establish its

own telegraph. In 1875, the Ministry of Defense laid the first telegraph line in Thailand between Bangkok and Somut Prakan. Later, the line was extended to Krachom Fai, to facilitate shipping at the mouth of the Chao Phraya.

In 1878, a telegraph line was laid from Bangkok to Bang Pa In and thence to Phra Nakhon Si Ayuthya. At first this line was used exclusively by the government, and its headquarters were in a building in the Royal Park.

In 1883, the Department of Telegraphs was established, taking over some of the operations from the Ministry of Defense. Public telephone service was begun on 26 July 1883. In the same year a telegraph line was extended from Bangkok through Prachinburi, Aranyaprathet, Sisophon and Phratabong, connecting with the Indochina telegraphic system. This was Thailand's first international telegraph link.

Telegraph expansion continued. In 1897, Thai telegraph was linked with the Burmese and, in 1898, with the Malayan systems. Today all parts of the country are connected by telegraph. In 1949, there were 241 lines and 22,000 km. of line. In 1960, there were 281 lines and 29,000 km.

When the Department of Telegraphs was a year old, the government issued the Telegraph Law of 1884. This law remained in effect until 1934 when it was superceded by the Telegraph and Telephone Law of 1934, which is still in force.

Thailand became a member of the World Telegraph Organization in 1885 -- the same year in which she joined the World Postal Organization -- and sent representatives to the meetings called to settle international telegraph conventions.

Telegraphic communications are for the most part in Morse code. Originally, of course, Morse had been contrived for Roman alphabets only. The Thais, therefore, had to go to the trouble of transcribing their language into Roman letters for transmission. In 1912, a Thai version of Morse Code was devised. In 1957, Saman Punyaratapan, an officer in the Department of Mail and Telegraph Service, invented a Thai-English teleprinter, called the 'S.P. Thai-English Teleprinter' after the inventor's initials. The teleprinter is a great convenience and the Department is now in the process of converting the whole Thai system over from the old-fashioned transmission methods.

VI. Telephone Communications

A. Bangkok and Thonburi. The first telephones in Thailand were used on the Bangkok-Somut Prakan-Krachom Fai telegraph line in 1881 to relay shipping information between Bangkok and the mouth of the Chao Phraya. There were only two telephones -- one at each end of the line.

When the Department of Telegraphs took over telegraphic operations

from the Ministry of Defense in 1886, public telephone service was instituted, but only in the Bangkok area. The first telephones used were of the Magnito system which the user had to crank up when he made a call. When service began, there were 61 subscribers, including private persons and government offices. When the Department of Mail and Telegraph Service was formed, telephone operations became the responsibility of that department, too.

The Magnito system telephone equipment, in use since the beginning of the service, was in a delapidated condition, and so the Department of Mail and Telegraph Service converted to the manual system. This system needed a central operator to serve the users. The Department established the central telephone offices in the old Postal and Telegraph Training School. This building soon proved to be too small and the present office at Wat Liab was built.

In 1922, there were 1,422 telephones in use, averaging 16,528 calls a day. The number of telephones multiplied rapidly in succeeding years so much so, in fact, that the Department had to expand and a second central office had to be built in Bangkok. Underground telephone cables were laid to the central office in 1928. By this time telephone service was being extended beyond the immediate Bangkok area to Somut Prakan, Nontaburi, and Nakhon Pathom.

After this the demand for telephones grew rapidly and the manual system was no longer efficient enough. In 1937 the Department converted to the automatic system. This system has been in use ever since.

Additional telephones offices were established at Ploenchit, Samsen, Phahonyothin, and Thonburi as part of the expansion of telephone service. In 1958, public phones and telephone kiosks were introduced.

By December of 1960, there were 6 telephone areas, 45,276 telephones, 96 public phones, and 106 telephone kiosks in the Bangkok-Thonburi area.

B. Provincial Telephone Service. The Department of Mail and Telegraph Service is presently working to extend telephone service generally throughout the provinces. Provincial telephone systems are being set up, often with telephone offices and operators located in the postal-telegraph offices. At first most provincial areas use the manual system phones.

Slowly telephone service is increasing in the provinces. Chiangmai, for example, in 1956 had 292 telephones. Now (1960) there are at least 600. Progress continues in the rest of the provinces as occasion and the budget permit.

In 1957 there were 45 central telephone offices serving the main cities and 6,220 private numbers.

C. Long Distance Telephone Service. To provide long distance telephone service between provinces, the Postal and Telegraph Department made use of existing telegraph facilities and connections. Operating offices and centrals were established in already existing postal and telegraph offices. In 1958 there were 245 such places.

VII. Radio Communications

A. Radio-Telegraph. In 1904, when radio was just getting started in Europe, a foreign company received permission to set up experimental 'wireless' communications in Thailand. Two Telefunken radio sets were used. One was set up on the highest spot in the Bangkok area at the Sisaket temple and the other was placed on Sichang Island. The experiment was continued for several days.

In the years following, the government grew increasingly interested in wireless communications. In 1907, Prince Boromwong, Governor of Kampaengpetch, reported to the king on the advances in radio communications in Europe.

In 1907, the Royal Navy for the first time installed Marconi (English) wireless sets in its facilities. In the same year the Army had Marconi sets imported from Europe for its communications system.

The first international conference on wireless was held in Berlin in 1906 and the second was in London in 1912. Thailand sent representatives to both these conferences and the regulations proceeding from them were translated into Thai. The word 'withayu,' from the Sanskrit for 'without wires,' was coined to mean radio.

In 1913 the Navy was ordered to construct two radio-telegraph stations -- one in Bangkok and the other in Songkla -- for communications with each other and with shipping. On 13 January 1913 the king transmitted the first Royal message delivered by radio to the head of the Songkla station:

"GREETINGS TO YOU ON THIS, WHICH WILL BE ONE OF THE MOST IMPORTANT DAYS IN OUR HISTORY." [English in text]

Navy operation of the Bangkok-Songkla system continued until the government transferred all responsibility for radio-telegraph communications to the Postal and Telegraph Department in 1919. Navy personnel remained to operate the equipment until 1926. Since then more and more stations have been established until radio communication is general throughout the country.

B. International Radio-Telegraph. On 15 January 1928, radio-telegraph service was opened between Bangkok and Berlin. In the Royal dedication ceremonies the king transmitted the following message to the Thai ambassador:

"SIAMESE MINISTER BERLIN GREETINGS AM GLAD TO BE ABLE TO SEND FIRST MESSAGE DIRECT BANGKOK-BERLIN RADIO.

PRAJADHIPOK R." /English in text/

Today Thailand has fifteen radio-telegraph links with foreign countries using Morse and Teletype transmission.

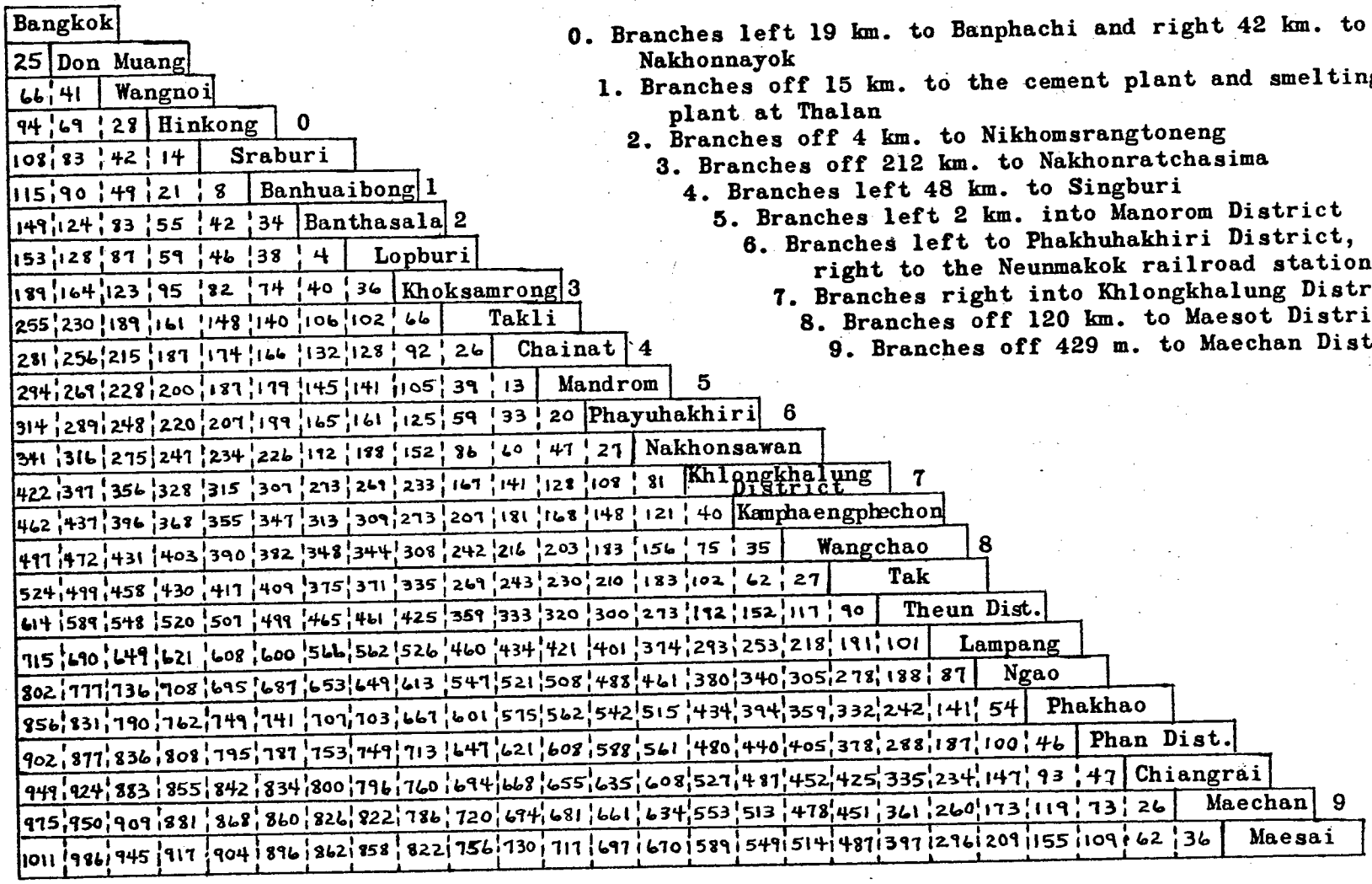
C. National Radio-Telephone. Thailand does not yet enjoy the benefits of radio-telephone service; but, as the budget permits, the Postal and Telegraph Department plans to install the system.

D. International Radio-Telephone. On 14 June 1931, radio-telephone service was opened between Bangkok and Berlin. Since then service has been slowly extended, and progress is such that people may look forward to the convenience of radio-telephone communications from their own homes and offices.

E. Other. In 1929 the government established the first public service radio broadcasting station, broadcasting to all of Thailand.

In 1931 the Air Radio communications system was brought into existence under the Civilian Air Bureau, Department of Commerce, Ministry of Communications.

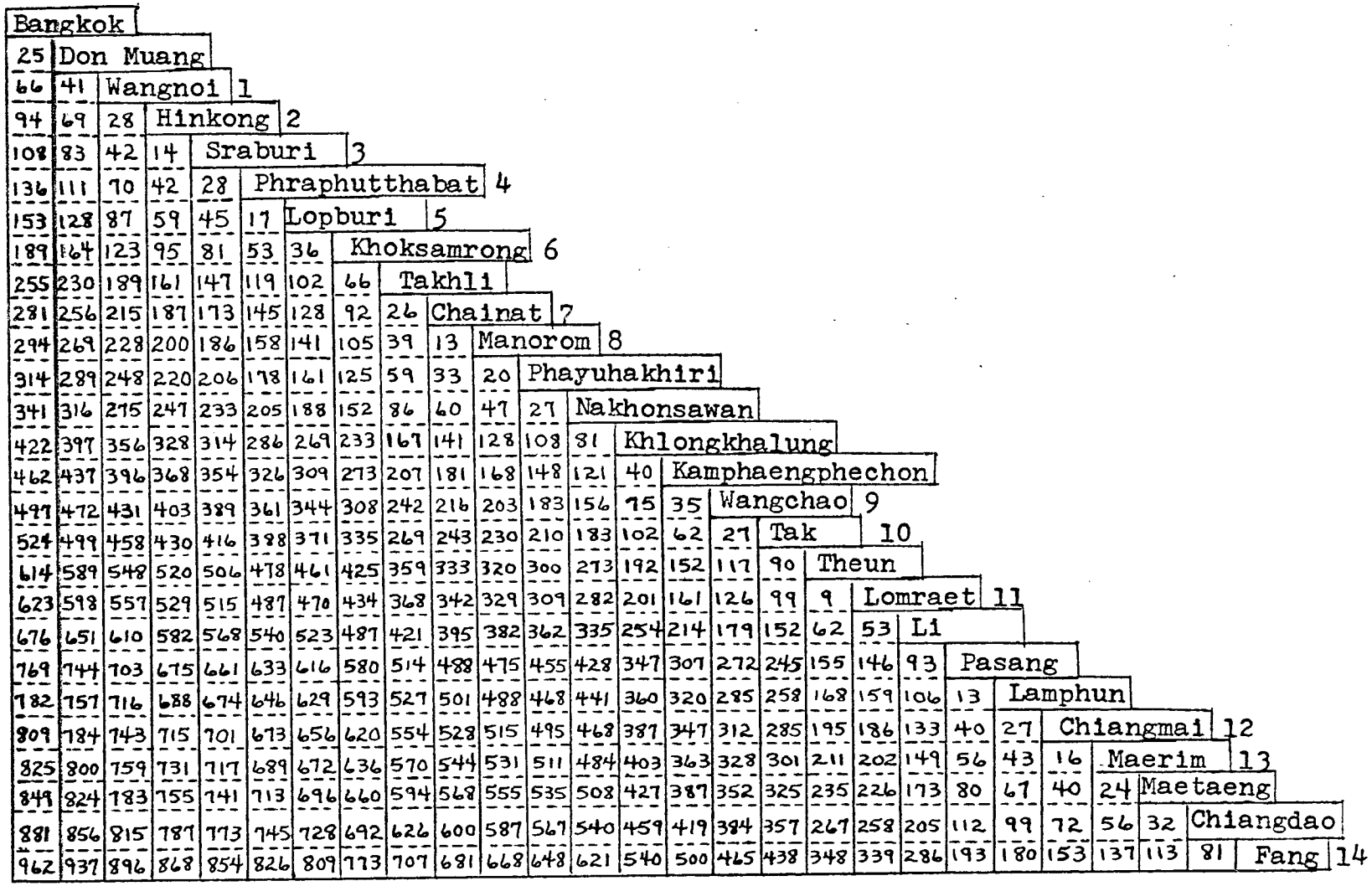
ROUTE FROM BANGKOK TO MAESAI



0. Branches left 19 km. to Banphachi and right 42 km. to Nakhonnayok
1. Branches off 15 km. to the cement plant and smelting plant at Thalan
2. Branches off 4 km. to Nikhomsrangtoneng
3. Branches off 212 km. to Nakhonratchasima
4. Branches left 48 km. to Singburi
5. Branches left 2 km. into Manorom District
6. Branches left to Phakhuhakhiri District, right to the Neunmakok railroad station
7. Branches right into Khlongkhalung District
8. Branches off 120 km. to Maesot District
9. Branches off 429 m. to Maechan District

Through the Courtesy of the Support Division, Dept. of Public Highways

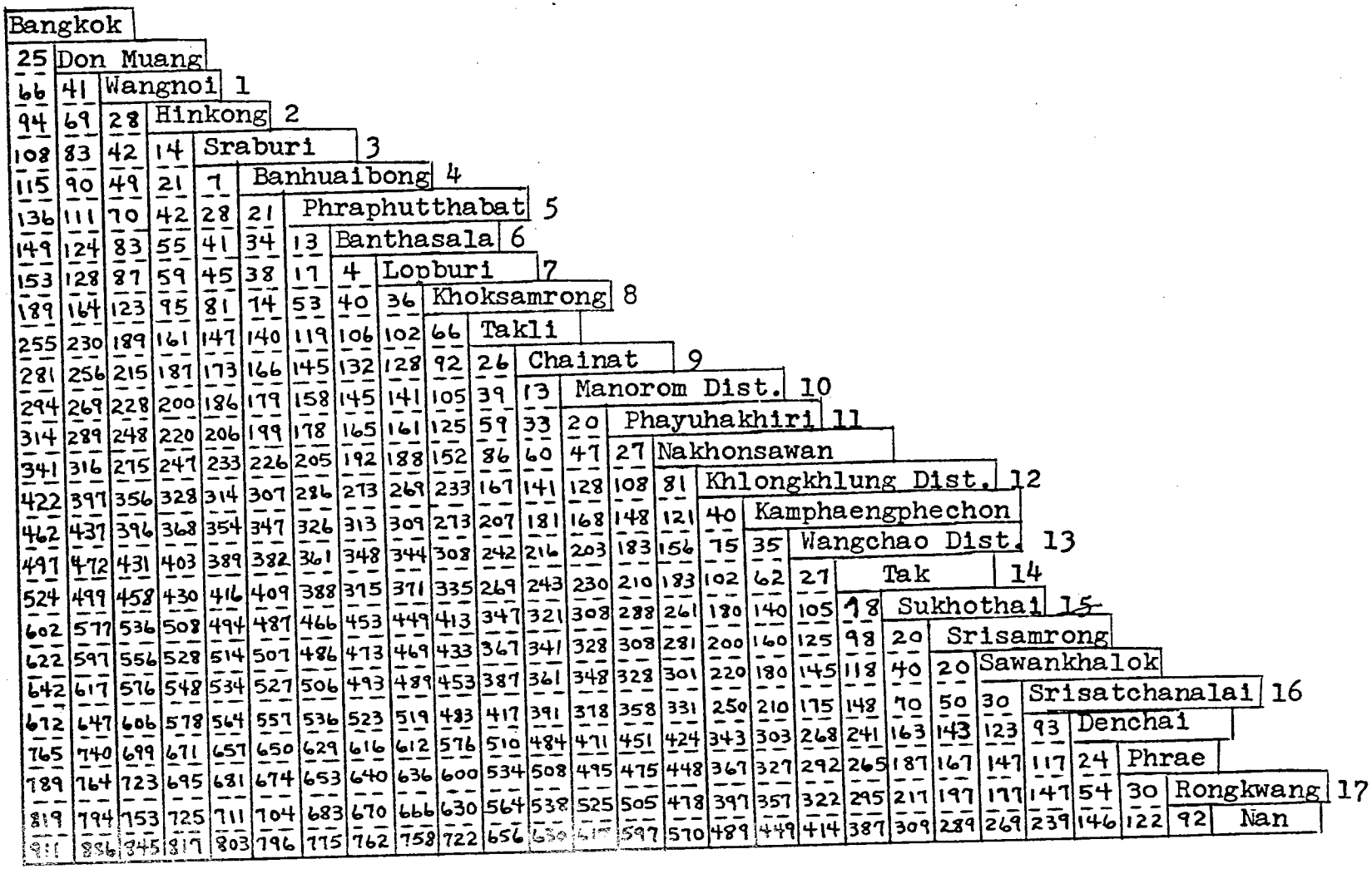
ROUTE FROM BANGKOK TO FANG



Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches right 113 m. to the Wangnoi Dist. seat
1. Branches left 20 km. to Ayutthaya
2. Branches right 42 km. to Nakhonnayok
2. Branches left 19 km. to the junction of the Banphachi railroad
3. Branches off at kilometer post 107 for 149 km. to Nakhonratchasima
4. Branches left into Phraphutthabat
5. Branches left 26 km. to Singburi
6. Branches right 212 km. to Nakhonratchasima
6. Branches left at kilometer post 171 for 14 km. to Banmi
7. Branches off 48 km. to Singburi (still under construction)
8. Branches left 2 km. into Manorom Dist.
9. Branches off 120 km. to Maesot
10. Branches off 78 km. to Sukhothai
10. Branches off 118 km. to Sawanrotlok
10. Branches off 137 km. to Phitsanulok between Tak and Theun at kilometer post 571 it branches off 20 km. into Phumiphon
11. Branches off 92 km. to Lampang
11. Branches off 321 km. to Chiangrai
11. Branches off 388 km. to Maesai
12. Branches off 14 km. to Jankamphaeng
12. Branches off 11 km. to Sansai
12. Branches off 103 km. to Chomthong-Hot
13. Branches off to Jameung
14. Branches off 8 km. to Pongnamron
14. Branches off 5.538 km. to the Fang oil well

ROUTE FROM BANGKOK - TAK - SUKHOTHAI - NAN



Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches right 663 m. to the Wangnoi Dist. seat
1. Branches left 20 km. to Ayutthaya
2. Branches left 19 km. to Banphachi
2. Branches right 42 km. to Nakhonnayok
3. Branches off kilometer post 107 for 149 km. to Nakhonratchasima
4. Branches off 15 km. to the Thalan cement plant and smelting plant
5. Branches left into Phraphutthabat
6. Branches off 4 km. to Nikhomsrangtoneng
7. Branches off 26 km. to Singburi
8. Branches off 212 km. to Nakhonratchasima
8. Branches off at kilometer post 171 for 14 km. to Banmi
9. Branches off 48 km. to Singburi
10. Branches left 2 km. into Manorom Dist.
10. Branches off 13 km. to Uthaithani
11. Branches left into Phayuhakhiri Dist.
11. Branches right to the Neunmakok railroad sta.
12. Branches right into Khlongkhalung Dist.
13. Branches off 120 km. to Maesot
14. Branches left 90 km. to Theun
15. Branches right 58 km. to Phitsanulok
16. Branches right 31 km. to Uttaradit
17. Branches off 21 km. to Song Dist.

ROUTE FROM BANGKOK - KHOKSAMRONG - WICHIANBURI - WANGCHOMPHU - PHECHONBUN - DANSAI

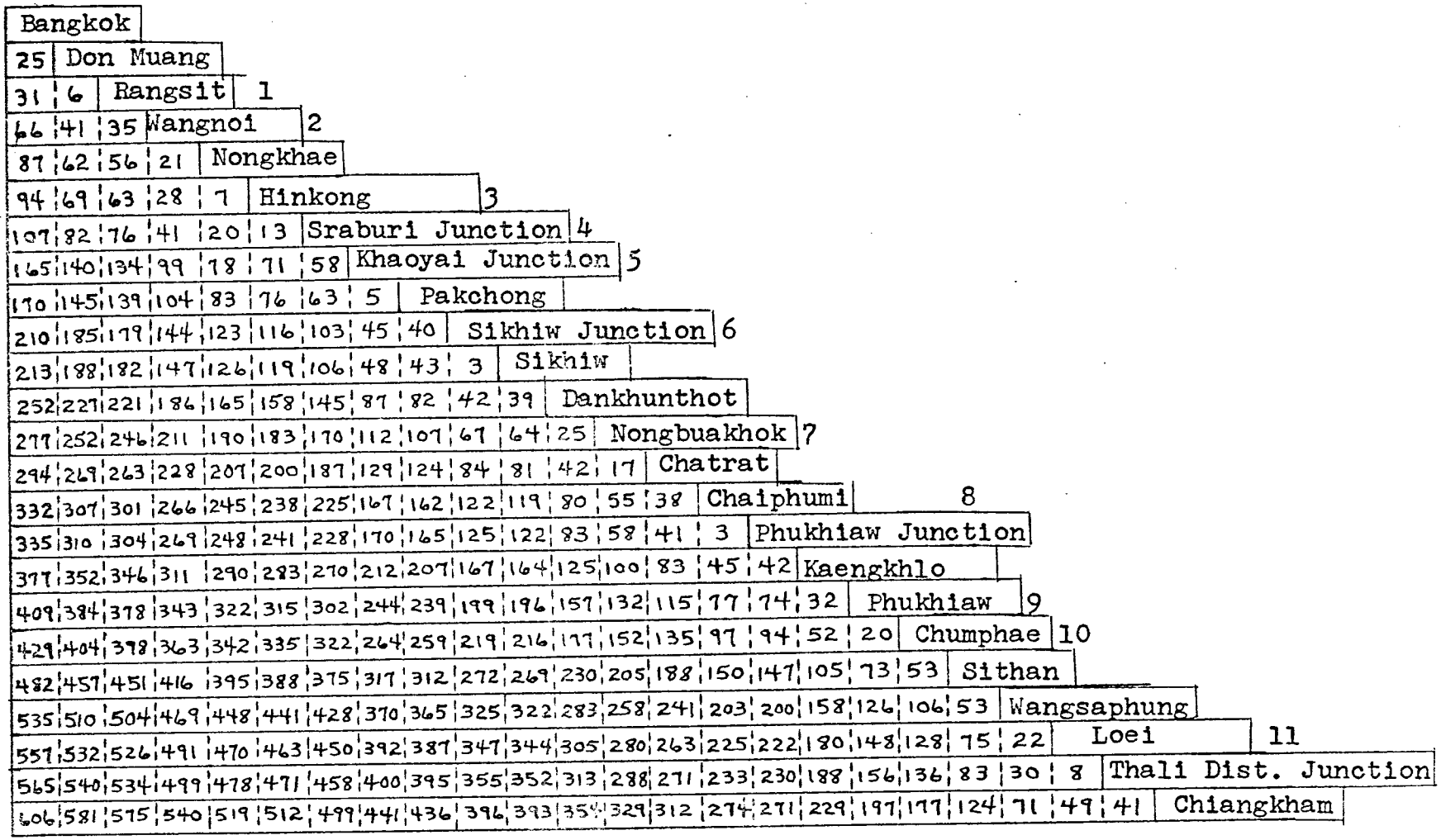
Bangkok																		
25	Don Muang																	
66	41	Wangnoi	1															
94	69	28	Hinkong	2														
108	83	42	14	Sraburi	3													
136	111	70	42	28	Phraphutthabat	4												
153	128	87	59	45	17	Lopburi	5											
189	164	123	95	81	53	36	Khoksamrong	6										
244	219	178	150	136	108	91	55	Lamnarai	7									
298	273	232	204	190	162	145	109	54	Wichianburi									
341	316	275	247	233	205	188	152	97	43	Nongphai								
377	352	311	283	269	241	224	188	133	79	36	Wangchomphu	8						
399	374	333	305	291	263	246	210	155	101	58	22	Phechonbun						
428	403	362	334	320	292	275	239	184	130	87	51	29	Thamphra	9				
438	413	372	344	330	302	285	249	194	140	97	61	39	10	Phitsanulok	10			
443	418	377	349	335	307	290	254	199	145	102	66	44	15	5	Lomsak			
456	431	390	362	348	320	303	267	212	158	115	79	57	28	18	13	Lomkao		
499	474	433	405	391	363	346	310	255	201	158	122	100	71	61	56	43	Pongchi	
517	492	451	423	409	381	364	328	273	219	176	140	118	89	79	74	61	18	Khokngam 11
537	512	471	443	429	401	384	348	293	239	196	160	138	109	99	94	81	38	20 Dansai

Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches right 15 km. to Thanburi Dist.
1. Branches left 15 km. to Pathumthani
2. Branches left 20 km. to Ayutthaya
3. Branches left 19 km. to Banphachi
3. Branches right 42 km. to Nakhonnayok
4. Road goes straight 45 km. to Lopburi
5. Branches off 40 km. into Khaoyai
6. Road goes straight 46 km. to Nakhonratchasima
7. Branches right 62 km. to Nakhonratchasima
7. Branches left 151 km. to Khoksamrong
8. The Chaiphumi - Buayai road for 52 km.
9. Branches left 22 km. to Ketsatonsombun Dist.
10. Branches right 34 km. to Phuwiang Dist and 31 km. to Khonkaen
11. Branches left 74 km. to Bankhokngam

Note - Distances over 500 meters are given as the next highest kilometer

ROUTE FROM BANGKOK - CHAIPHUMI - LOEI - CHIANGKHAN



Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches right 15 km. to Thanburi Dist.
1. Branches left 15 km. to Pathumthani
2. Branches left 20 km. to Ayutthaya
3. Branches left 19 km. to Banphachi
3. Branches right 42 km. to Nakhonnayok
4. Road goes straight 45 km. to Lopburi
5. Branches off 40 km. into Khaoyai
6. Road goes straight 46 km. to Nakhonratchasima
7. Branches right 62 km. to Nakhonratchasima
7. Branches left 151 km. to Khoksamrong
8. Chaiphumi-Buayai Rd. 52 km.
9. Branches left 22 km. to Ketsatonsombun Dist.
10. Branches right 34 km. to Phuwiang Dist. and 81 km. to Khonkaen
11. Branches left 74 km. to Bankhokngam
12. Branches left 36 km. to Thali Dist.

Note - Distances over 500 meters are given as the next highest km.

ROAD FROM BANGKOK - NAKHONRATCHASIMA - KHONKAEN - UDONTHANI - NONGKHAI

Bangkok																						
25	Don Muang 0																					
66	41	Wangnoi 1																				
94	69	28	Hinkong 2																			
107	82	41	13	Sraburi Junction 3																		
165	140	99	71	58	Khaoyay Junction 4																	
170	145	104	76	63	5	Pakchong Dist.																
210	185	144	116	103	45	40	Sikhiw Dist. Junction															
256	231	190	162	149	91	86	46	Nakhonratchasima														
262	237	196	168	155	97	92	52	6	Chcho 5													
304	279	238	210	197	139	134	94	48	42	Bantalatkhae 6												
351	326	285	257	244	186	181	141	95	89	47	Bandongkheng 7											
362	337	296	268	255	197	192	152	106	100	58	11	Bankhokchik 8										
407	382	341	313	300	242	237	197	151	145	103	56	45	Phon Dist.									
437	412	371	343	330	272	267	227	181	175	133	86	75	30	Manchakhiri Dist. Junction 9								
439	414	373	345	332	274	269	229	183	177	135	88	77	32	2	Banphai Dist. 10							
482	457	416	388	375	317	312	272	223	220	178	131	120	75	45	43	Khonkaen 11						
559	534	493	465	452	394	389	349	300	297	255	208	197	152	122	120	77	Bankhokphakwan 12					
604	579	538	510	497	439	434	394	345	342	300	253	242	197	167	165	122	45	Utrathani 13				
617	592	551	523	510	452	447	407	358	355	313	266	255	210	180	178	135	58	13	Bankhad Township 14			
633	608	567	539	526	468	463	423	374	371	329	282	271	226	196	194	151	74	29	16	Thadu Township 15		
645	620	579	551	538	480	475	435	386	383	341	294	283	238	208	206	163	86	41	28	12	Nikhomnongsonghong 16	
658	633	592	564	551	493	488	448	399	396	354	307	296	251	221	219	178	99	54	41	25	13	Nongkhai

Through the Courtesy of the Support Division, Dept. of Public Highways

0. Branches into Don Muang Airfield
1. Branches left 20 km. to Ayutthaya
2. Branches right 42 km. to Nakhonnayok
2. Branches left 19 km. to Banphachi
3. Branches right into Friendship Highway
3. Goes straight 45 km. to Lopburi
4. Branches right 40 km. into Khaoyai
5. Branches off 106 km. to Khoksamrong (Suranarai Road)
6. Branches off 10 km. to Phimai District
7. Branches off 84 km. to Chaiphumi
8. Branches into the road under construction from Khokchik--Phutthathaysong - Saduk - Buriram
9. Branches 10 km. into Chonbot Township and 22 km. into Manchakhiri District
10. Branches off 70 km. to Mahasankham
11. Branches off 209 km. to Loei Province
12. Branches off to Kumphawapi District
13. Branches off 122 km. to Wangsaphung District
13. Branches off 157 km. to Sakonnakhon
14. Branches off 42 km. to Banphu District
15. Branches off 13 km. to Phen District
16. Branches off 30 km. to Thabo District

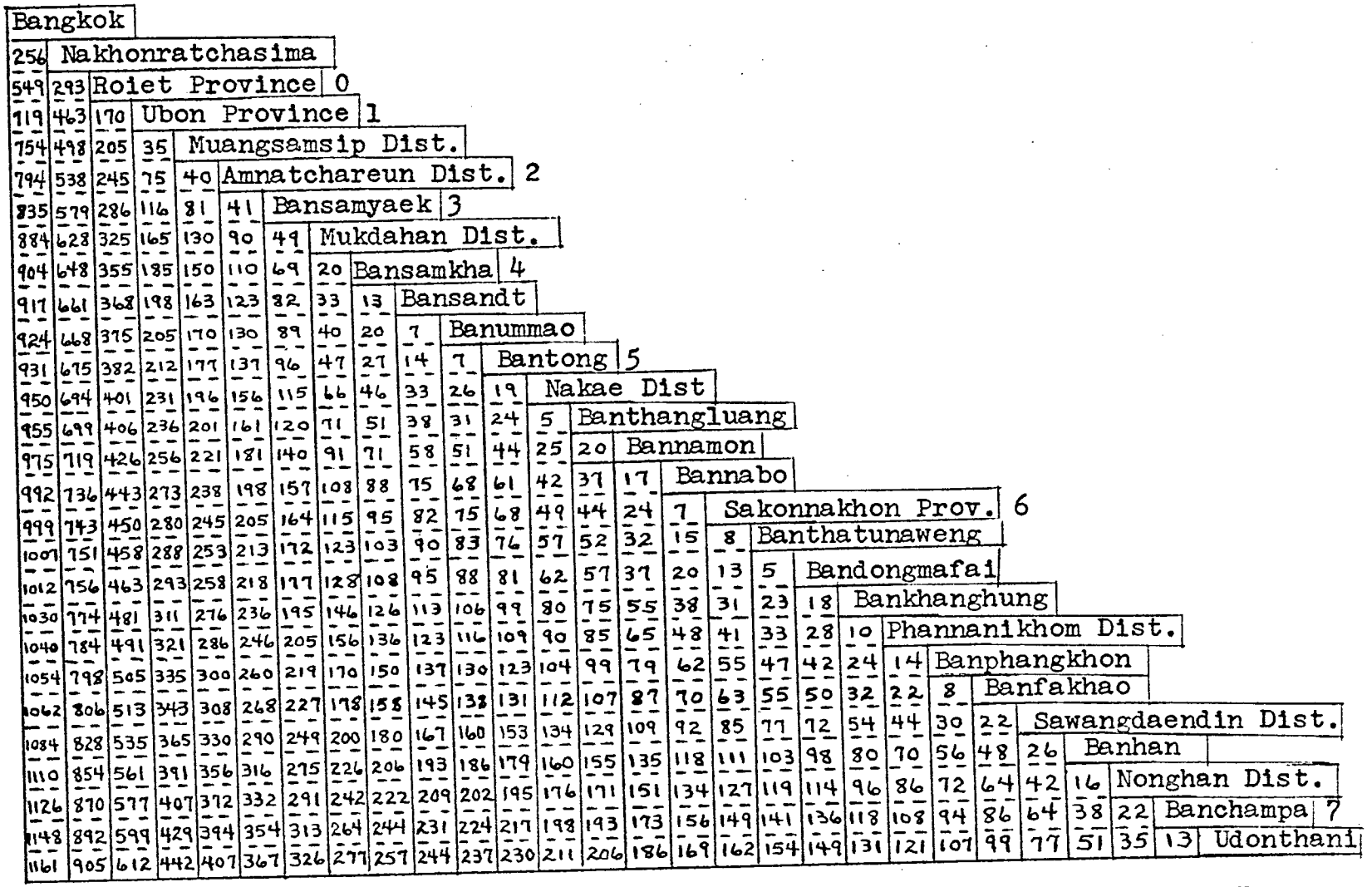
ROUTE FROM BANGKOK - BANPHAI - MAHASANKHAM - KALASIN - SUKONNAKHON - NAKHONPHANOM

1. Branches left 10 km. to Chonbot and 22 km. to Manchakhiri District. Goes straight 43 km. to Khonkaen
2. Branches right 20 km. to Wapipathum District and 40 km. to Phayakkhaphumiphisai District
3. Branches right 40 km. to Roiet
4. Branches left to Chiangyun District
5. Branches right 81 km. to Thatuphanom
6. Branches left 162 km. to Udonthani
7. Branches right 53 km. to Banrenu and 60 km. to Thatphanom

Bangkok																			
107	Sraburi Junction																		
256	149	Nakhonrat-chasima																	
439	332	183	Banphai	1															
461	354	205	22	Nonghaen															
484	377	228	45	23	Barabu	2													
491	384	235	52	30	7	Banpluai													
509	402	253	70	48	25	18	Mahasankham	3											
525	418	269	86	64	41	34	16	Kantharawichai	4										
537	430	281	98	76	53	46	28	12	Yangtalat										
544	437	288	105	83	60	53	35	19	7	Khoksi									
553	446	297	114	92	69	62	44	28	16	9	Kalasin								
570	463	314	131	109	86	79	61	45	33	26	17	Nachan							
584	477	328	145	123	100	93	75	59	47	40	31	14	Nongphaom						
623	516	367	184	162	139	132	114	98	86	79	70	53	39	Srangkho					
673	566	417	234	212	189	182	164	148	136	129	120	103	89	50	Sakonnakhon	5			
681	574	425	242	220	197	190	172	156	144	137	128	111	97	58	8	Thatunaweng	6		
714	607	458	275	253	230	223	205	189	177	170	161	144	130	91	41	33	Kusuman		
721	614	465	282	260	237	230	212	196	184	177	168	151	137	98	48	40	7	Banmai	
745	638	489	306	284	261	254	236	220	208	201	192	175	161	122	72	64	31	24	Napho
769	662	513	330	308	285	278	260	244	232	225	216	199	185	146	96	88	55	48	24	Nakhonphanom	7

Through the Co[illegible] of the Support Division, Dept. of Public Highways

ROUTE FROM BANGKOK - UBONRATCHATHANI - UDONTHANI



Through the Courtesy of the Support Division, Dept. of Public Highways

0. Branches off 47 km. to Ketsadonwisai District
1. Branches off 2 km. to Warinchamrap District
2. Branches off 52.5 km. to Yasothon District
2. Branches off 71.704 km. to Khemrat District
3. Branches off 4.5 km. into Leungnoktha District
4. Branches off 5 km. to Bansonghong, Wanyai Township, Mukdahan District
5. Branches off 6 km. to Thatphanom
5. Branches off 57 km. to Nakhon Phanom
6. Branches off 80.179 km. to Nakhon Phanom
7. Area connecting Muang District and Nonghan District at kilometer post 17.5
8. Branches off 54 km. to Nongkhai
8. Branches off 122 km. to Khonkaen
8. Branches off 122 km. to Wangsaphung District.

ROUTE FROM BANGKOK TO CHONGMEK

Bangkok																									
25	Don Muang 0																								
66	41	Wangnoi 1																							
94	69	28	Hinkong 2																						
107	82	41	13	Sraburi Junction 3																					
165	140	99	71	58	Khaoyai Junction 4																				
170	145	104	76	63	5	Pakchong Dist.																			
210	185	144	116	103	45	40	Sikhiw Dist. Junction																		
256	231	190	162	149	91	86	46	Nakhonratchasima																	
262	237	196	168	155	97	92	52	6	Choho 5																
304	279	238	210	197	139	134	94	48	42	Bantalatkhae 6															
351	326	285	257	244	186	181	141	95	89	47	Bandongkheng 7														
362	337	296	268	255	197	192	152	106	100	58	11	Bankhokchik 8													
407	382	341	313	300	242	237	197	151	145	103	56	45	Phon.Dist.												
437	412	371	343	330	272	267	227	181	175	133	86	75	30	Manchakhiri Dist. Junction 9											
439	414	373	345	332	274	269	229	183	177	135	88	77	32	2	Banphai Dist. 10										
484	459	418	390	377	319	314	274	228	222	180	133	122	77	47	45	Barabu Dist. 11									
509	484	443	415	402	344	339	299	253	247	205	158	147	102	72	70	25	Mahasankham Province 12								
549	524	483	455	442	384	379	339	293	287	245	198	187	142	112	110	65	40	Roiet Province 13							
561	536	495	467	454	396	391	351	305	299	257	210	199	154	124	122	77	52	12	Thawatburi Dist.						
581	556	515	487	474	416	411	371	325	319	277	230	219	174	144	142	97	72	32	20	Selaphumi Dist. 14					
619	594	553	525	512	454	449	409	363	357	315	268	257	212	182	180	135	110	70	58	38	Yasothon Dist. 15				
641	616	575	547	534	476	471	431	385	379	337	290	279	234	204	202	157	132	92	80	60	22	Khamkhuankaew			
681	656	615	589	574	516	511	471	425	419	377	330	319	274	244	242	197	172	132	120	100	62	40	Khuangnai Dist.		
719	694	653	625	612	554	549	509	463	457	415	368	357	312	282	280	235	210	170	158	138	100	78	38	Ubon Province 16	
721	696	655	627	614	556	551	511	465	459	417	370	359	314	284	282	237	212	172	160	140	102	80	40	2	Warinchamrap Dist. 17
764	739	698	670	657	599	594	554	508	502	460	413	402	357	327	325	280	255	215	203	183	145	123	83	45	43	Phibun Dist. Junc.
797	772	731	703	690	632	627	587	541	535	493	446	435	390	360	358	313	288	248	236	216	178	156	116	78	76	33	Chongmek

Through the Courtesy of the Support Division, Dept. of Public Highways

0. Branches into the Don Muang Airfield
1. Branches off 20 km. into Ayutthaya
2. Branches right 42 km. to Nakhonnayok
2. Branches left 19 km. to Banphachi
3. Road goes straight 45 km. to Lopburi
4. Branches off 40 km. into Khaoyai
5. Branches off 206 km. to Khoksamrong (Suranarai Road)
6. Branches off 10 km. to Phimai District
7. Branches off 84 km. to Chaiphumi
8. Branches into the road under construction from Khokchik - Phutthathaisong - Saluk - Buriram
9. Branches off 10 km. into Chonbot Township
9. Branches off 22 km. into Manchakhiri District
10. Branches off 43 km. to Khonkaen
11. Branches right 25 km. to Wapipathum District and 40 km. to Phayakkhaphumiphisai District.
12. Branches off 42 km. to Kalasin
13. Branches off 27 km. to Chatunphakphiman District
13. Branches off 47 km. to Ketsatonwisai District
14. Branches off 30 km. to Phonthong District
15. Branches off 53 km. to Amnatchareun District
16. Branches off 35 km. to Muangsamsip District
17. Branches off 43 km. to Detchaudom District

ROUTE FROM BANGKOK - NAKHONNAYOK - PRACHINBURI - ARANYAPRATHET - BORDER

Bangkok																	
25	Don Muang																
31	6	Rangsit	1														
66	41	35	Wangnoi	2													
87	62	56	21	Nongkhae													
94	69	63	28	7	Hinkong	3											
108	83	77	42	21	14	Wihandaeng Dist. Junction	4										
120	95	89	54	33	26	12	Banna	5									
137	112	106	71	50	43	29	17	Nakhonnayok	6								
148	123	117	82	61	54	40	28	11	Pakphli								
151	126	120	85	64	57	43	31	14	3	Bannongkankela	7						
158	133	127	92	71	64	50	38	21	10	7	3-way Junction into Prachinburi	8					
179	154	148	113	92	85	71	59	42	31	28	21	Prachantakham	9				
204	179	173	138	117	110	96	84	67	56	53	46	25	Kabinthaburi	10			
250	225	219	184	163	156	142	130	113	102	99	92	71	46	Srakaew			
277	252	246	211	190	183	169	157	140	129	126	119	98	73	27	Wattananakhon	11	
299	274	268	233	212	205	191	179	162	151	148	141	120	95	49	22	Aranyaprathet	12
305	280	274	239	218	211	197	185	168	157	154	147	126	101	55	28	6	Border

Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches right 15 km. to Thanburi District
1. Branches left 15 km. to Pathumthani
2. Branches left 20 km. to Ayutthaya
3. Branches left 19 km. to Banphachi
3. Goes straight 14 km. to Sraburi
3. Branches right 42 km. to Nakhonnayok
4. Branches off 7 km. to Wihandreng District
5. Branches right 200 meters into Banna District
6. Branches off 18 km. to the Nangrong Waterfalls and 15 km. to the Sarika Waterfalls
7. Branches left 81 km. to Chacheungsao
8. Branches off 8 km. into Prachinburi
9. Branches right 1 km. into Prachantakham District
10. Branches right 1.5 km. into Kabinthaburi
10. Branches left 139 km. at kilometer post 207.691 to Nakhonratchasima
11. Branches right 1 km. into Wattananakhon District
12. Branches right 26 km. to Nongpru
12. Branches left 50 km. to Taphraya sub-district

ROUTE FROM BANGKOK TO TRAT

Bangkok																									
Mutharaprakan	25																								
Bangpu	36	11																							
Khlongdan	55	30	19																						
Bangpakong 1	75	50	39	20																					
Branches right into Chonburi 2	94	69	58	39	19																				
Samet Twp. 3	100	75	64	45	25	6																			
Saensuk Twp. 4	104	79	68	49	29	10	4																		
Bangphra Twp. 5	111	86	75	56	36	17	11	7																	
Branches left to Hot Springs 6	113	88	77	58	38	19	13	9	2																
Sriracha 7	116	91	80	61	41	22	16	12	5	3															
Sriracha Sawmill 8	118	93	82	63	43	24	18	14	7	5	2														
Banglamung Dist.	140	115	104	85	65	46	40	36	29	27	24	22													
Phatthayatai 9	147	122	111	92	72	53	47	43	36	34	31	29	7												
Kletkaew	167	142	131	112	92	73	67	63	56	54	51	49	27	20											
Sattahip 10	175	150	139	120	100	81	75	71	64	62	59	57	35	28	8										
Rayong 11	221	196	185	166	146	127	121	117	110	108	105	103	81	74	54	46									
Klaeng Dist.	269	244	233	214	194	175	169	165	158	156	153	151	129	122	102	94	48								
Banpatian 12	278	253	242	223	203	184	178	174	167	165	162	160	138	131	111	103	57	9							
Branches into Thamai Dist. 13	315	290	279	260	240	221	215	211	204	202	199	197	175	168	148	140	94	46	37						
Chanthaburi 14	324	299	288	269	249	230	224	220	213	211	208	206	184	177	157	149	103	55	46	9					
Branches into Makham Dist. 15	333	308	297	278	258	239	233	229	222	220	217	215	193	186	166	158	112	64	55	18	9				
Branches into Laemsing Dist. 16	348	323	312	293	273	254	248	224	237	235	232	230	208	201	181	173	127	79	70	33	24	15			
Khalung Dist. 17	356	331	320	301	281	262	256	252	245	243	240	238	216	209	189	181	135	87	78	41	32	23	8		
Khaosaming Dist.	384	359	348	329	309	290	284	280	273	271	268	266	244	237	217	209	163	115	106	69	60	51	36	28	
Trat	400	375	364	345	325	306	300	296	289	287	284	282	260	253	233	225	179	131	122	85	76	67	52	44	16

Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches off 25 km. to Chacheungsao
2. Branches left 14.84 km. to Banbung District
2. Branches right 1.286 km. into Chonburi Province
3. Branches right 15.054 km. into Angsila
4. Branches right 2.65 km. into the resort town of Bangsaen
5. Branches right 800 m. into Hatkaptanyut
6. Branches right 2.5 km. into Phrabatbangphra
7. Branches right 1.5 km. into Talatsriracha
8. Branches left into the Atsasamchan School
9. Branches right 2.275 km. into Phatthayatai
10. Branches right 1.8 km. into Talatsattahip
11. Branches right 2 km. into Rayong
11. Branches left 12 km. to Bankhai District
12. Branches right 9.36 km. to the mouth of the Prasea R.
13. Branches right 4.5 km. into Thamai District
14. Branches right 8 km. into Chanthaburi
15. Branches left 7 km. to Makham District
16. Branches right 15.72 km. to Laemsing District
17. Branches right 1.5 km. into Khalung District.

ROUTE FROM BANGKOK TO NAKHONSRITHAMMARAT

1. Branches off 105 km. to Suphannaburi
2. Branches left 3 km. into Prachuapkhirikhan
3. Branches left 7 km. into Chumphon
4. Branches off 53 km. to Phuket
5. Branches off 5 km. into Talatkao
6. Road goes straight 6 km. to Kuaiyot
7. Branches off 29 km. to Pakphanang District
8. Branches off 11 km. to Thaphae

Bangkok																				
58	Nakhonpathom 1																			
110	52	Ratchaburi																		
166	108	56	Phechonburi																	
232	174	122	66	Huahin																
257	199	147	91	25	Pranburi															
323	265	213	157	91	66	Prachuap 2														
499	441	389	333	267	242	176	Wangphai (Chumphon) Twp. 3													
554	496	444	388	322	297	231	55	Kraburi												
614	556	504	448	382	357	291	115	60	Ranong											
788	730	678	622	556	531	465	289	234	174	Takuapa										
869	811	759	703	637	612	546	370	315	255	81	Khokkloi 4									
910	852	800	744	678	653	587	411	356	296	122	41	Phangnga								
997	939	887	831	765	740	674	498	443	383	209	128	87	Bantalatkao (Krabi) 5							
1099	1041	989	933	867	842	776	600	545	485	311	230	189	102	Nakhon Jct. 6						
1108	1050	998	942	876	851	785	609	554	494	320	239	198	111	9	Banhuaina					
1125	1067	1015	959	893	868	802	626	571	511	337	256	215	128	26	17	Bankapang				
1135	1077	1025	969	903	878	812	636	581	521	347	266	225	138	36	27	10	Banthiwang			
1143	1085	1033	977	911	886	820	644	589	529	355	274	233	146	44	35	18	8	Thungsong		
1165	1107	1055	999	933	908	842	666	611	551	377	296	255	168	66	57	40	30	22	Ronphibun	
1192	1134	1082	1026	960	935	869	693	638	578	404	323	282	195	93	84	67	57	49	27	Salamichai 7
1196	1138	1086	1030	964	939	873	697	642	582	408	327	286	199	97	88	71	61	53	31	4	Nakhonsrit-hammarat 8

Note - Distances over 500 meters are given as the next highest kilometer

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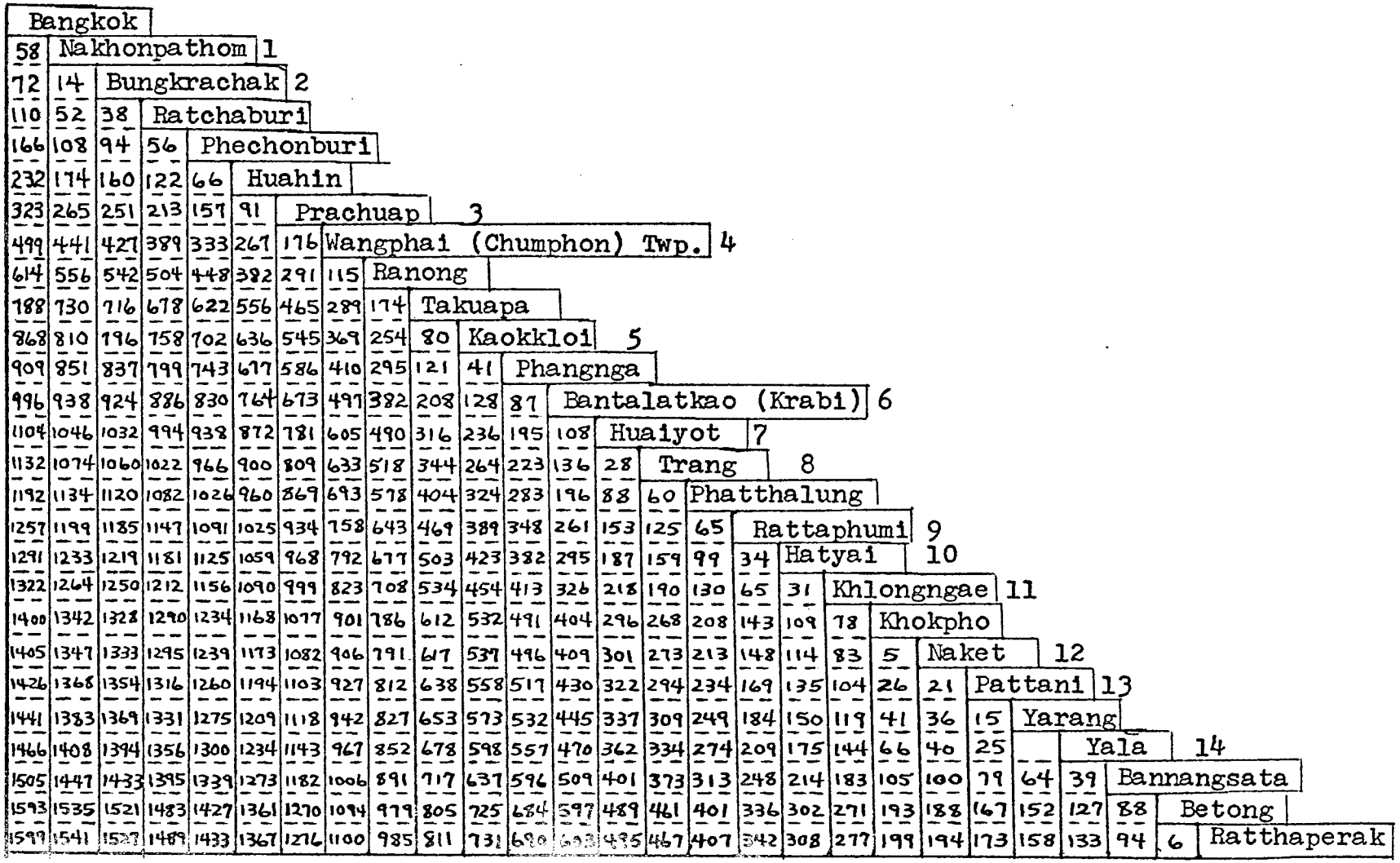
ROUTE FROM BANGKOK TO RATTHAPERAK



Through the Courtesy of the Support Division, Dept. of Public Highways

1. Branches off 105 km. to Suphannaburi
2. Branches off 7 km. to Banpong and 58 km. to Kanchanaburi
3. Branches off 3 km. into Prachuapkhirikhan
4. Branches off 7 km. into Chumphon
5. Branches off 53 km. to Phuket
6. Branches off 5 km. into Talatkao-Krabi
7. Branches off 97 km. to Nakhon...
8. Branches off 28 km. to Kantang
8. Branches off 53 km. to Palian
9. Branches off 14 km. to Khuanniang
9. Branches off 64 km. to Satun
10. Branches off 72 km. to Songkhla
11. Branches off 33 km. to Sadao - Padangbecha
11. Branches off 31 km. to Sadao - Saiburi
12. Branches off 26 km. to Banniang
13. Branches off 100 km. to Narathiwat
13. Branches off 122 km. to Narathiwat - Tanyongmat
14. Branches off 21 km. to Banniang - Yaha
14. Branches off 16 km. to Thaman

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CHAPTER 7

NATIONALITIES OF THAILAND [ETHNIC GROUPS] 209

The nationalities of Thailand, differentiated according to language and customs, are listed as follows.

1) Thai. Apart from the chief Thai people, there are also:

a) Thai Yai, Kheun, and Leu. These tribes originate in the Thai Yai territory in Burma and in the Sipsong Panna region of China. In Thailand they are found chiefly in the northern districts of Maehongson, Chiangmai, and Chiangrai and Lampong. (For the Kheun, see the Royal Academy's Encyclopedia.)

b) Phu Thai, Phuan, and Seung. These tribes' place of origin is in the Sam Neua and Xieng Khouang (5th and 6th districts) areas in Laos. In Thailand the Phu Thais are found in Sakon Nakhon and Nakhon Phanom in the Northeast Region. The Phuan and Seung live in scattered groups in the Central Region, especially in the Sukhothai, Lopburi, Saraburi, Rachaburi and Kanchonburi areas. The languages of these three tribes are very similar and they must be classified as belonging to the same branch as the Thai.

c) Kaleung, Yo, and Yoi. These are Thai tribes originating in the Mekhong valley. They are found in the Sakon Nakhon and Nakhon Phanom areas. (For the Kaleung, see the Royal Academy's Encyclopedia.)

d) The Samsan. Of mixed Thai and Malayan stock, they are found in the southern part of Thailand in the Yalu, Narathiwas, and Satun areas.

2) Mon - Khmer

a) The Khmer. They are found mainly in the Eastern Region in Buriram Surinath, and Sisaket areas. They are sometimes called the Khmer Sung [High Khmer] to distinguish them from the Low Khmer living in Cambodia.

There are also some groups of this tribe living in the Central Region around Prachinburi, Chantaburi, and Trat.

b) The Mon. They are located mainly in the Central Region around Somutprakan, Pathumburi, Phranakhon Si Ayuthya, Lopburi, and Rachaburi.

c) The Lawa, Lawa Chaobon, and Lawa Muangkanach. These all belong to the same tribal group. The Lawa Chaobon, or Nigagun, live in the Petchbun, Chaiphumi, and Nakhon Rachasima areas in the Central and Eastern Regions. The Lawa Muangkanach live in the Kanchonburi area of the Central Region. Dr. Erik Seidenfaden is of the opinion that the Muangkanach may be of Tibeto-Burmese derivation but the general feeling is that they properly belong in the same group as the other two Lawa tribes mentioned here.

d) Kui (Suai). This tribe is found in the Surinat and Sisaket areas of the Eastern Region. (For the Kui, see the Royal Academy's Encyclopedia.)

e) Chong. This tribe is found in the Trat and Chantaburi areas in the Eastern Region, near the Cambodian border.

f) Khamu, Thin, Kaso, Saek, Yeu, Khaprao and Khaleuang. The Khamu and Thin live in the Nan area of Northern Thailand. The Khamu are of Kha stock from the Mekhong area. Of the Thin tribe, located east of Nan, Dr. Seidenfaden reports that they have frequent social contact with the Palong tribes in Burma. The Kaso, Saek, Yeu, Khaprao, and Khaleuang people are all part of the Kha group. (See the Royal Academy's Encyclopedia.) The Kaso and Saek are found in the Sakon Nakhon and Nakhon Phanom areas. The Yeu are located around Sisaket and the Khaprao and Khaleuang around Ubon Rachathani.

g) Sakai. This tribe is located in the Southern Region.

3) Thibeto-Burmese.

a) Thuai. This is a branch of the Yakai (Aracanese) tribal group. They immigrated to Thailand and settled permanently in the Yan Nawa area (then called Ban Thuai) in the 18th century.

b) Ko (Kaw). They are found in the Northern Region, chiefly in the Chiangmai, Chiangrai, and Phrae areas. (See the Royal Academy's Encyclopedia.)

c) Musoe (or the two groups of the Lahu and Lisaw). They are found in the Northern Region, in the Chiangmai, Chiangrai, and Maehongson areas.

4) Indonesian. (This refers to people originally from Malaya, called in English Proto-Malays, and not to peoples from present-day Indonesia.)

a) Chawa Malayu. Most of these people inhabit the southern part of the Southern Region. There are also some of this stock in the Central Region in the Phranakhon and Phranakhon Si Ayuthya areas.

b) Chao Nam [Sea People]. They are found along the western coast in the Southern Region. They are a sea-roving people, keeping no permanent settlements, and are called in English, 'Sea Gypsies.' In Malayan they are called Oranglaut (Sea people). Their Burmese name is Salang or Selang from Chalang, the Burmese name for Phuket Island. The Chao Nam call themselves, Mohen.

5) Negrito. The single Negrito tribe, the Semang (Ngo) is found in the Southern Region near Malaya.

6) Others. (of different stock than any of the above)

a) Kariang and Karang. These people are found chiefly in the Chiangmai, Chiangrai, Maehongson, Tak, Kanchinburi, Rachaburi, and Petchburi areas of northern and central Thailand. They are divided into a number of subgroups. (See the Royal Academy's Encyclopedia.) Some students have considered them to be of Thibeto-Burmese stock, others of Thai.

b) Yuan. They are located around Phranakhon and Chantaburi in the Central Region. They used to be thought a part of the Mon-Khmer group or of the Thais but present theory suggests that they may be of Indonesian derivation.

c) Meo, Yao, and Ho. These peoples are found mostly in the northern part of the country. The Meo and Yao have many Chinese elements in their language, customs, and traditions but their origins are uncertain. The Ho come from Yunan in China. Most of them are Chinese in race and Moslem in religion. Their ancestors were descendants of Kublai Khan's Mongol soldiers, who settled in Yunan and intermarried with the natives there. Europeans call these people by their Burmese name, Panthays. In Thai they are called Ho of Hui Hiu. (See Erik Seidenfaden, The Thai Peoples, 1958, and Oliver Gordon Young, The Hill Tribes of Northern Thailand, 1961.)

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CHAPTER 8

CUSTOMS AND TRADITIONS

Customs are those things which repeated usage has made a general habit. There are three classes of customs -- Moral customs, Rituals, and Etiquette.

Moral customs are customs relating to an ethical system which, in the general opinion of mankind, is valuable to society. Those who violate these customs are sometimes strongly condemned.

Rituals are those acts performed on the occasion of important incidents in life, such as births, deaths, marriages, certain special acts of charity, taking of monastic orders, and funeral cremations. Many customs which were originally 'moral' have become rituals.

Customs of Etiquette are common rules of good behavior. Defiance of these customs is considered not so much a sin as evidence of lack of breeding. Etiquette is inculcated by society by example and instruction and includes such acts as bowing respectfully to elders.

Customs and traditions range from those practiced exclusively by small social entities to those that are common to most of mankind. Generally customs all have a common basis.

If we were to examine Thai customs province by province there would be a great deal of repetition. Therefore, we will deal with customs on a regional basis -- Northern, Central, Southern, etc.

Generally speaking, customs in Thailand differ from region to region. In the Eastern Region, those districts nearest the Cambodian border are likely to be influenced by Cambodian ways. The same thing is true of those southern regions near the Malayan border where customs are Thai and Malayan mixed.

Now we shall examine some Thai customs by region, beginning with the Central Region.

A. Customs in the Central Region

Among most people the birth of a child is an occasion of great joy. The parents are very careful of the child's welfare, even when it is still in the womb. When the child is born, they note the time, day, month, and year in order to cast its horoscope and they obtain the aid of knowledgeable elders and a sooth-sayer in choosing an auspicious name.

After the child is born and washed, it is placed in a cushioned basket and wrapped in warm clothing. If the child is a boy, a book and pencil are placed next to it. If it is a girl, a needle and thread are used instead. Then the doctor or midwife lifts the basket up in the air, reciting a charm, and carefully drops it down on the ground, to make the child cry and be afraid. Then, three times, the father or an elder, acknowledge the child to be legitimate. A magic thread is placed around the basket to ward off misfortune. After three days the child is placed in a cradle. This is accompanied by a ceremony attended by the relatives in which the child's head is shaved. Traditionally, the child's head was kept shaved until his seventh, or even thirteenth year, as this was considered a protection against disease.

1. Monastic Orders. In Thailand it is considered a religious duty and a means of earning merit for the next life for young men of the Buddhist faith to serve a period of time as monks. At around the age of twenty years young Buddhists customarily take holy orders. This custom serves several purposes. It marks the coming of age of the young man. It is a way of acquainting him with the tenets of the Buddhist religion. It is a means of earning 'merit' and, finally it is an honor to his parents.

The parents are very happy when they have a son entering the monastery and they spend a lot of money on the ceremonies. Friends and relatives are invited from all over and the best possible accomodations are provided for them.

The candidate has to announce to the monks his intention of entering the monastery and he has to learn all the things he must know upon entering.

Three days before he leaves home there is a ceremony at his house in which he takes leave of his elders. His head is shaved and he is given a new name. The next two days are spent in preparation for his new life. On the last night before he leaves, a 'luck-giving' ceremony is held in the home. Monks chant religious verses and a homily is delivered by one of them encouraging the youth to adhere diligently to the religious life regardless of obstacles. His relatives pass candles from hand to hand in a circle around him and a priest binds his wrists with magic thread. After the ceremonies a dinner party is commonly held.

The next morning he is taken to the monastery and he walks around it three times. Then he takes leave of his parents who present him with his robes. The parents also give gifts to the monk who will be their son's mentor.

From then on to the end of his term the boy belongs to the monastery. All his necessities are provided by the chapter and he accompanies the mendicants on their rounds. But special gifts or any sign of recognition by his relatives are forbidden.

Taking of holy orders can be done at any time of the year but it is most common during the three months of the rainy season. Those who serve a time as monks gain a certain fulfillment in their lives and the custom is considered very worthy and important by most Thais. In later life, after he has left the monastery, the man can still be provided for by the monks if he has need.

2. Marriage Customs. When a young man and woman make known their intention to be married, the parents and relatives take charge of the negotiations and arrangements. In past times the elders were entirely responsible and some couples never even saw each other before their wedding day. Nowadays, by the time most young people have reached early adulthood, they have had an opportunity to be away from home, as when they pursue their education; and, thus they often make their own acquantances and attachments.

Marriage practices begin when the man's elders, serving as marriage brokers, propose a match to the elders of the woman's family. The woman's people set the amount of the 'bride price' and the negotiations proceed from there.

The wedding date must be established. There is a custom that this must be on a Thursday in an even numbered month. However, in some places no marriages are made in the eighth month and are permitted in the ninth.

If the couple already has a home, the ceremony is held there. Otherwise it is usually held in the bride's home. There is a religious service led by priests.

Nowadays, some people prefer to hold the wedding in special assembly halls belonging to their clubs or social organizations. These halls are convenient because of their larger accomodations and because of their kitchen and ceremonial facilities. When halls like these are used, the family of the bride usually have a going-away party for her at their home.

3. Funeral Customs. When a person dies, his relatives call for a priest and flowers are placed on the body. Out of respect for the dead, quiet is maintained for at least two hours. By this time friends and relatives have arrived and they help to prepare the body and to pray and comfort the immediate relatives. The corpse is placed in a coffin and transported

(CC)

to the place where it will remain until the cremation. Priests and monks lead prayer services for two or three nights. If the body is not to be cremated elsewhere, it is taken to the temple area at such time as the family determines.

Cremation is the highest honor paid to the dead. All the friends and relatives who can are supposed to attend. On the day of the cremation the body is placed on the pyre in the temple area and, after the religious services and eulogies are over, it is cremated. Cremations are usually held between mid afternoon and mid night. Nowadays they are held on most any day except Friday. In some places no cremations are held on holy days or on the last day of the month.

4. Customs of the Trus and Songkran Festivals. The Trus, which according to the lunar calendar, is the last day of the year, occurs on the fifteenth day of the waning moon of the fourth month. Songkran is the 13th of April, according to the Solar Calendar, when the sun arrives in Aries. Traditionally these days are given over to donations to monks and the enjoyment of sports and pleasures.

The Trus festival actually begins on the fourteenth day of the waning moon of the fourth month (lunar). The fifteenth is Trus day. On this day presentations of dishes of noodles with pepper or chili sauce and various rice sweetmeats and desserts are made to the monks. People like, on this day, to remember the dead and to cause prayers and devotions to be made on their behalf. At mid-day people visit their elders and relatives or honor them with dinners. Quiet games are played in the shade. In the evening people meet for dancing the various folk dances of the region. Usually people dance with those of their own age. It is a holiday and adults amuse themselves with conversation and visiting, after the manner of adults. The evening, for them too, is given over to music and dancing.

Often the celebrations continue on from the Trus through to the Songkran without a break. But some years there is a three to four day period between the two holidays; and, if the interim is that long, the festivities are likely to be interrupted. The Songkran festival begins on 13 April. The fourteenth is an interim day and the fifteenth is the first day of the Siamese New Year. It is the beginning of the business year and prayers are offered for good fortune in undertakings. As in the Trus festival, people earn merit by giving alms to the monks and they enjoy dancing and sport. The images in the temples are bathed and families build sand hillocks in the temple grounds. Elders are honored in a ceremony in which water is poured over their hands. People splash each other with water and release pet fish and birds.

There is an old tale told about Songkran.

A Brahman angel, called the Lord of the Songkran, once challenged a certain man of law to answer a riddle within seven days on pain of losing

his head if he should fail. If he answered correctly, the Lord of the Songkran would cut off his own angelic head.

The man of law was unable to solve the riddle. On the day before he was to answer, as he was walking along pondering the riddle, he came to a large tree and sat down in its shade. There he chanced to overhear a female eagle making a complaint to her mate as to where they would find food for their young on the morrow. The male eagle confidently reassured her, saying that there would be food enough. For tomorrow the man of law would fail to answer the riddle and he would have his head chopped off. The female eagle besought her husband to tell her what this riddle was that carried so violent a penalty. Her mate proceeded to tell her both riddle and answer. The man of law (who understood the language of birds) heard all and was able to solve the riddle.

The Lord of the Songkran, having lost the wager, cut off his own head as he had promised; but not before calling his seven daughters to his side and commanding them to carry his head off on a golden charger to his home. He further commanded them not to throw his head into the sea, for it would dry up all the water; nor to bury it underground, for that would cause the world to be consumed by flame. He told them that if they passed his head through the air it would cause the rain to cease. The seven daughters obeyed his commands and bore his head away on a golden charger to his home in the caverns of the Mountain Kailas in the Himalayas, the eternal abode of Siva. Each year about the thirteenth of April they bear his head in a procession around the mountain and a different daughter takes her turn as Lady of the Songkran.

5. The Loi Kratong Festival. In this festival the people set light floats adrift on the waterways. These floats are made of banana leaves, fashioned in the form of animals, boats, etc., according to the imagination of the maker. In the floats are placed lighted candles and little flags and offerings of food and flowers. The festival is held annually on the night of the full moon in the twelfth month. It is intended as a thanksgiving to the Buddha and a means of propitiating the water goddess and averting misfortune. 214

When, on that night, there are no clouds and the moon is shining brightly and the water runs high on the banks, the people are cheerful and happy. They set their little floats adrift on the rivers and canals and offer up prayers from the heart. The floats are caught in the current and are carried off, and if they do not sink, and if the candles stay lit, the people can watch them until they drift far out of sight. When the floats are numerous they present the beautiful sight of a great mass of bobbing, twinkling lights in motion.

This custom is also found in the Northern and Eastern Regions where it takes place at the end of the rainy season.

B. Customs in the Northern Region

1. The Songkran Festival. In the north the Songkran festival comes on the thirteenth, fourteenth, and fifteenth of April, as in the Central Region.

The thirteenth of April is called Kanlong day. On this day the people clean their homes and make everything neat, finally washing their clothes, bathing, and combing their hair. When everything and everyone has been well scrubbed they decorate themselves and their houses with flowers. On the next day the people spend a lot of time and money in the markets purchasing what they will need for the almsgiving and feasting on the morrow. On all of these days they are careful to control their speech and there is no swearing and reviling of one another, everyone trying to be happy and remain pleasant. Early on the fourteenth they build sand pagodas and hillocks on the temple grounds.

The fifteenth day of April is Songkran day, called here 'Phanawan.' It is the most important day of the year. In the morning the people bring food offerings to the temples and do reverence to their parents and elders. They return home for breakfast and then go back to the temple to hear sermons and place offerings of food on their sand pagodas.

All through the three-day festival the people go about splashing each other with water. It is thought that the water washes away the evils and misfortunes of the old year and the splashing is the occasion of general merrymaking and happiness.

2. The Dapoi Ceremony. In the Northern Region, children who are intended for the monastic life are offered to the monastery by their parents at an early age. If a child comes from a very impoverished family, or, for one reason or another, cannot go on to further education beyond the elementary level, and if he cannot be useful in the family business, farsighted elders are wise to send him off to a monastery to be a 'Khayom,' or 'Temple Child.' There he will live among friends and monks and will not easily be tempted into wrong-doing. In the monastery he will be taught reading and writing and something of the religion and customs of the people. This initial period of instruction lasts one or two years, according to the boy's ability. At the end of this period the boy's family formally releases him to the monastery in the Dapoi ceremony.

In this ceremony the family ratifies the agreement with the monastery. Then, with the boy, they all visit the homes of their friends and neighbors to seek blessings. They take along two or three girls who carry monks' robes on platters. The processing stops at those houses that the leader indicates and he says to the head of the house:

"This our son is to enter the monastery today. He comes to seek your blessing."

The householder thus addressed takes one of the platters carried by the girls and, raising it to his forehead, expresses his blessing and happiness. Friends, relatives, and neighbors are all glad to attend and assist at this ceremony.

The candidate then is escorted to the monastery where he is dressed in ornamented and embroidered robes; a crown is placed on his head, and he is mounted on a horse. Then, shaded by a ceremonial umbrella, he leads a procession, to the music of drums, back to his home where his crown is removed and a Khuan ceremony is held. The actual ceremonies for entering the monastery are held later in the day or on the next.

The subsequent ordination ceremony, called 'Pek' in the north, is accompanied by a Dapoi just as is the entering into the novitiate, except that there is no procession.

3. The Poi Luang Ceremony. The Poi Luang, or dedication of a new temple, is an important ceremony in the north. In this ceremony, the people who have helped build the temple by donations or labor, celebrate the completion of their work and receive blessings. For the most part Poi Luang ceremonies are held during the second to seventh months of the year because this is the dry season and the weather is more likely to be good. The monks and the faithful determine how long the festivities will last -- two, three, five, or seven days, etc. -- according to the wealth of the people and the monastery. When the date is set, the officials of the monastery seek the blessing and attendance of the heads of neighboring monasteries. The faithful of the community also take part, but to avoid unnecessary confusion, their part is reserved to the last day of the festival, when they have a noisy, merry procession. The evening of that day is spent in sport and pleasure and there are bonfires everywhere. During the festival the people gather in the temple and hear sermons and chanting of religious verse. Guest preachers deliver homilies on the Buddhist rule and 'merit' earning ceremonies of almsgiving are held.

4. The Thansalak. The Thansalak, or donation-lottery festival, occurs annually during the tenth month. It is an important donation ceremony and a lot of money and time is spent on it.

There is a custom connected with it, called the Thansalakyom, in which young girls play the central part. A girl may participate when she comes of age, and her parents are sure to prepare her by teaching her what she must do beforehand. This is chiefly to collect and save all kinds of things of value for the Thansalakyom. In the old days it was felt that a girl should not marry until she had participated in this custom, because the collecting and saving of odds and ends, sometimes for five or six years, was considered good training and evidence that she was properly frugal and would make a good housekeeper.

When the girl has saved enough money and things, the Thansalak is prepared. She spends the money she has saved on necklaces, a silver belt,

household effects, fruit, bunches of bananas and coconuts, and other foods and sweetmeats. A tree is set up in the house and all these things are attached to its branches. On the day of the Thansalak, the monks come with tickets for these things. The tickets have been purchased and given to them as alms.

A ballad-maker is hired to compose a poetic biography of the girl which is read to the guests, among whom are likely to be a number of eligible bachelors. A good poet trys to make this biography as interesting and entertaining as he can; and, besides her life story, he includes humorous things and religious and moral instruction. The poem ends with a blessing on the girl and, no matter whether it is read in the day or night, it is enjoyed by all.

The family is willing to pay a lot to get eloquent readers; for, through the poem, the girl is being advertised as eligible for marriage.

On the regular Thansalak she is escorted to the temple where she gives alms to the monks.

5. Chanting of the Scriptures. Once a year, during the twelfth month, it is the custom for the people to assemble at the temples and monasteries to hear recitations and chantings of the Mahachat and other scriptures and works of religious instruction. These recitations last for two, five, or seven days, depending on the religious enthusiasm of the people.

The monastery which is offering these religious exercises publishes an announcement to the effect, and the people gather at the monastery on the appointed day.

The different sections of the Mahachat are best chanted by certain kinds of voices. The best voice for chanting the Chuchok, Maharach, and Nakhonkan parts is a strong bass. For the Mathri, Kuman, and Sakaphap parts it is desirable to use chanters with high (but not childish) voices, and for the Chakasatriy, young monks with fine voices are used. Sometimes a commentary is given before the chanting begins and, at the end of each section, a poetic synopsis is delivered. The people gladly hear these chanted recitations for they believe that listening to them earns 'merit.'

6. Customs of Birth and Death. In general, customs surrounding the birth of a child do not differ much from those of the Central Region. In remote sections midwives are used, but even here the number of midwives is decreasing.

There is a custom in the north that when a person dies, his relatives walk to the homes of his friends to inform them. Then the relatives and friends place a wreath at the doorstep of his house to signify that one has died therein. This custom is falling into some disuse.

When there is a death, the neighbors bring gifts of food, money, etc., in honor of the deceased. Because the members of the family are often too grief-stricken, these friends stay around to help in the preparations for the funeral.

Normally bodies are cremated, but if the death was by violence or by accident the body is buried. The body is kept in the home for a period of two or three days, and longer in the case of a prominent person. If the deceased was a person of good position, a canopy or covering is placed over the coffin. If he was of no particular position, no canopy is used. If he was important in his life, his corpse is transported to the cremation site with considerable pomp, in a procession headed by priests and monks, with musical instruments. In the Northern Region most people willingly participate in cremation ceremonies as a chance for 'merit' earning.

7. Fireworks. In the Northern Region, certain important occasions such as the dedication of temples, schools, etc., are celebrated with a kind of fireworks. For this purpose tubes of metal, wood, or zinc are packed with explosive powder and the open ends are sealed with gum. A stick is attached to the tube which is decorated. People with these tubes make their way in a long, noisy parade to an open space far enough from human habitation to be safe. There are sometimes bleachers at these places and large crowds gather to watch the fireworks, for which prizes are often given.

C. Customs of the Eastern Region

1. The Khuan Ceremonies. The Khuan, or 'luck-giving' ceremonies, to invoke blessings and happiness, long and prosperous life, and success in undertakings, are held on various occasions such as when recovering from an illness, after the birth of a child, upon setting out on a journey, upon returning home, when moving into a new house, when taking holy orders, and at marriages, etc. The ceremonies are sometimes held in small, informal gatherings of friends and relatives and sometimes are large affairs with invited guests, as at weddings and official functions. The Khuan ceremonies held on the occasion of the Royal visit to the North East on 12 November 1955 were probably the most impressive of their kind and were attended by all the prominent men of the region.

For the Khuan ceremony, plates and bowls of 'auspicious' rice garnished with flowers, and incense candles, steamed rice, distilled liquor, eggs, and chicken or pork (especially the head, tail and feet) are prepared. The person for whom the ceremony is being held, has with him a blanket, glass, comb, and thread for binding the wrists.

The ceremony is usually held in the home or on some available lawn of grounds. There the blanket, brought by the one who is being honored, is spread out on the ground and the various bowls and plates are placed on it. The time for the ceremony differs according to the occasion.

Those connected with births and housewarmings are held in the morning; for recovery from illness, in the evening; and for weddings, at mid-day.

When everything is ready, the participants sit down in a circle around the blanket. If the ceremony takes place in a special hall with such facilities, the ceremonial experts and the elders sit on a raised dais and the receiver and his friends and other relatives sit below them. The ceremony begins with the elevating of the Khuan bowls. The master of the ceremony announces for whom it is being held and for what occasion. Then the incense candles are lit and the bottles of liquor are opened and everyone sits quietly for the invocation of the blessing. After this everyone's hands are annointed with liquor and thread is bound around the wrists, first of the one who is being honored, then of his parents and the rest of his relatives. The rest of the guests clap hands to signify unity. Then the liquor is poured and everyone drinks of it slowly while the blessing is said. The words of this blessing are in poetic form and in the vernacular and are, of course, religious in theme. There are different versions for the different occasions.

After the ceremony, a feast with entertainment and games, is provided for the guests.

2. Marriage Customs. In the Eastern Region the wedding ceremony is called 'Kindong' which signifies that the ceremony marks an alliance between the families of the bride and the groom.

Before there can be a wedding, arrangements must be made. When a man and woman decide to be married, the man informs his parents who arrange to have a family elder call on the family of the woman. This elder visits the home of the woman, usually in the early evening, when the work of the day is done. He informs them of the wish of his kinsman and they begin the negotiations and plans for the ceremony.

The parents of the woman ask her if she bears true love to the suitor. Then the parents are asked if they consent to the marriage and under what conditions. If the answers are affirmative then the conditions are negotiated. If agreement cannot be reached, the negotiations are discontinued and the wedding does not take place. If the woman is willing and the parents consent and the 'bride price' is settled, then arrangements are made to select an auspicious day for the wedding. If there is any delay in setting the date, the suitor's family must put up a portion of the 'bride price' as security. The cost of the ceremony and the accomodation of the guests are commonly shared by both families.

Weddings may be held on any day of the waning moon period of any month except during the rainy season, when weddings are usually not held.

After the wedding the groom commonly moves in with his bride at her parent's home, until the couple can establish themselves. This is done especially if the bride is an only child. If the groom is an only child

and comes from a prosperous family, the bride may move into his parents' home. These matters all have to be settled in the preliminary negotiations. Some negotiations prove fruitless after days of effort; others are quickly successful. The chief purpose and benefit of these negotiations is that, through them, both sides are satisfied that the marriage has a chance of success and that the man will be able to support a family. At the successful conclusion of the negotiations a dinner is given to celebrate and ratify the agreement.

After this, everyone prepares for the ceremony. The man's family gets the funds for the 'bride price.' The woman's family assembles her dowry of household utensils, etc., and both families clean up everything -- especially the wedding room. Invitations are sent to all their friends and relatives.

If the groom is to live at the bride's home, the ceremony, called the 'Dongsu,' is held there. If the bride is to live at the groom's home, duplicate ceremonies, called 'Dongtam,' are held at each home.

The wedding ceremony begins with a procession and a Khuan ceremony and the blessings of the elders are sought. The friends and relatives all arrive early on the wedding day to feast and participate in the ceremonies. At the appointed time the groom and his family and guests go in procession from his house to that of the bride. When the procession arrives, her people bar the door, demanding to know the purpose and intentions of this crowd. After the proper answers have been given and some jesting banter has been exchanged, the doors are opened and the groom's party enters, rewarding the one who opened the door. Once inside, the groom stands on a special mat and his feet are washed. It is the belief that this will help to insure his faithfulness and constancy. Then he is led off to the Khuan ceremony by the bride's relatives. At this time his elders and parents give presents to the bride's parents.

When the 'bride price' has been received and approved, the bride is led to the Khuan ceremony and seated to the left of the groom. The Khuan ceremony is performed as mentioned before, except that there is no drinking. A hard boiled egg from the Khuan platter is divided and the bride and groom each eat half. The bride and groom then take incense candles in their hands, and, bowing to their parents, relatives, and guests, ask the blessings of all. The elders bless them, wishing them all happiness and prosperity, and give them words of advice.

After this ceremony a large dinner is given for all the guests. This completes the 'Dongsu' wedding. If it is a 'Dongtam' wedding, the bride is led in procession to the groom's house where another Khuan ceremony is held. In some areas it is the custom to hold the ceremony in the bridal bedroom. After the bride and groom have retired, everyone tries to maintain relative quiet. The members of both families partake of refreshments together and from then on they are considered members of the same family.

The next morning alms are given to the monks, either at the home or in the temple. In the afternoon the bride and groom visit the homes of their relatives with candles, cushions, and cleaning materials. They offer to work and the relatives give them assignments, advice, and pay for their work. The pay is in the form of seed, animals, poultry, and money -- all contributing to the establishment of their household. If there are many relatives the bride and groom spend several days on these visits.

The family permits the couple as much privacy as possible to make them happy during these first days. Nevertheless, they take the opportunity to advise their children on the practical problems of earning a living as well as the problems of domestic life. Any money that the children earn while living at their parents' house is turned over to the parents. Sometimes they live under these conditions until their first child is born. Then the parents turn their earnings back to them and they set up their own household. If possible they build their house on family land and the relatives come to help them.

These customs are a great advantage to the new couple. They cement family ties and make for better relations with the relatives. They are a help in establishing a household and give valuable experience to the man and his wife. Parents and relatives who have already succeeded in life and work are able to give them much good advice and instruction, whereby they can avoid gross mistakes as much as possible.

There are also customary familial ways of settling quarrels between the man and his wife. If a difficulty cannot be settled within the house, elders of both families are called in for consultation and advice. They decide who is at fault after questioning both parties. The guilty one is urged to apologize and amend his or her behavior. Sometimes a Khuan ceremony is held to promote family unity. If the quarrel runs deep and even the elders cannot settle it, sometimes the wrong-doer is expelled from the house for a period.

The man and his wife, if they are dutiful, always remember to honor their elders on both sides by using respectful titles when addressing them and by behaving humbly in their presence. Good children always come to the aid of their parents in time of trouble or when there is important work to do. When their elders are ill they come to visit and, if necessary, remain to nurse them back to health.

Today the wedding customs are changing. Many of the customs of the Central Region are becoming current in the north.

3. <u>The Thambun Customs.</u> The Thambun (customs or acts such as donations to monks, acts of charity, participation in religious ceremonies, etc., which, it is believed, earn for a person merit or credit for the next life) are practiced on many occasions throughout the year.

During the first lunar month penance Thambun is held. This is a public ceremony at which the people hear sermons and present gifts of raiment, food, bedding, and medicine to the monks.

During the second lunar month Thambun ceremonies are held for the harvest. They are held either at the threshing sites or at the granaries -- wherever the rice is.

On the third day of the waning moon of the third lunar month a Thambun and Khuan ceremony is held for the labor in the fields for that year. Gifts of food and other things are given to the monks in the monasteries and sermons on the Buddhist doctrine are heard. During this month Thambun is celebrated for the Makhbucha also.

The annual Prawes Thambun is held in the fourth lunar month. This is the most important one of the year and people from several households of each neighboring village are invited. Shelters are put up around the monastery for the guests and visiting monks. This ceremony can be held in the fourth, fifth, and even sixth months because each village must hold one and they cannot be held simultaneously with that of another village. The ceremony lasts for two days. The first day is devoted to preparations and donations and the second to religious services. These days are marked by much good feeling and generosity in donations to the monastery.

During the fifth lunar month are held the 'bathing' ceremony in which the images in the temples are bathed. Water is ceremoniously poured over the hands of the elders and everyone goes about splashing each other. The images are set up in a special hall for the bathing ceremonies. The festival lasts for seven days.

During the sixth month are held the Bangfai, in which ceremonial bonfires are lit, and the Wisabucha.

In the seventh month the ceremonies for the excorcising of evil spirits are held. With the help of an image of the Buddha, the spirits are chased out of the house and peace is restored.

The Buddhist Lent (beginning of the rainy season) is celebrated in the eighth lunar month with candlelight processions and merit making donations to the monasteries.

On the last day of the ninth month there is a ceremony in which demons and spirits are appeased by gifts of food. The food is offered to the monks in a Thambun ceremony and they scatter it on the grounds around the monastery.

The Salakphat ceremony is held on a full moon day in the tenth month.

During the eleventh month the ceremonies marking the end of Lent (end of the rainy season) are held. This ceremony is marked by the Loi Kratong (floating lights).

The ceremonies of presentation of robes to the monks are held from the end of Lent through the twelfth month.

There are numerous other occurrences in which Thambun has a part, such as those surrounding the building of a new house, birth of a child, etc. These customs are still generally observed.

4. Funeral Customs. Funeral customs differ according to the kind of death. There are two categories:

Evil Deaths. This refers to those who have died of dangerous contagious diseases like cholera, small pox, etc.; or to those who have died by violence (i.e., suicide, murder, struck by lightning, crushed by falling trees, drowned, etc.). Bodies of people who have died in these ways are buried, not cremated. The burial is done secretly by friends and relatives and without display or publicity (except for informing the authorities). There are no religious ceremonies and no coffin is used. The burial is a hasty affair and if no inquest is performed immediately, the body is buried without it. If such an unfortunate died far from home, he is buried where he fell. Drowning victims are buried on the shore. If the death was in the home, the body is wrapped in a mat and buried in a special cemetery for the uncremated. Public expression of grief or love for the deceased is forbidden. Such a death is considered evil and the thing of first importance is to bury the body and clean the house. Only after this can time be spent in religious services.

After a sufficient time has passed, the body may be exhumed and cremated, according to the status of the deceased and the wealth of the family. Nevertheless, even this later cremation is likely to be a simple affair, without many guests. Commonly the family hires people to perform the necessary offices.

Normal deaths. This refers to deaths not by violence or plague but under normal circumstances as by lesser diseases and old age.

The bodies of children who have died under normal circumstances are buried in special children's cemeteries. The ceremonies are brief and no coffin is used. If the dead child was under a year old the body is wrapped in a simple winding sheet and buried in a cradle with offerings of rice, milk, and water. The only religious service is a Thambun held at the home after the burial.

Cremations are held in the larger 'normal death cemeteries' found in most villages. If there is no such place convenient, the body is taken to a nearby cemetery or monastery with cremation ceremonies.

The size of the cremation ceremony depends on the age and position of the deceased and the importance of his family. When the deceased is a parent or important elder, the family is likely to spend a great deal on the ceremony -- often more than they can well afford. Sometimes families are obliged to sell some of their property. They willingly do this, however, because they believe it is the last honor and display of esteem they may offer to the deceased, and because they believe that by so doing they can contribute to his greater happiness in the next life. Moreover, if the family were parsimonious in this instance, they would receive the general censure of their neighbors.

When a death occurs, the family, friends, and relatives gather to prepare the body -- washing it, clothing it, and combing its hair, etc. The wrists are tied together across the chest and an incense taper is placed in the clasped hands. The corpse is then bound with three bands -- one around the chest to hold the arms in place, one around the knees, and one around the ankles. The body is laid out in the center of the house with the head pointing in the direction of the 'Hong' room (a religious room containing an image of the Buddha. Such ceremonies as the Thambun, etc., are held here and the room also often serves as a guest room).

The following morning before noon, the monks are called to pray the service for the dead. At the head of the corpse an altar is placed with incense tapers and food on it.

The relatives come from all over to participate and to help the family with gifts of food and money. But their chief purpose in coming is to comfort the family and, so all these days, there are feasts and merry-making during which, among other things, boys and girls get acquainted. This celebration continues until the cremation.

The body is kept at home as long as the family can afford it, for this is expensive. The body is usually kept at home for three, five, or seven days. If the deceased was important enough during his life, this period may be as long as fifteen days or a month. If the period is long, the body is annointed with perfume and placed in a hermetically sealed coffin or container. A pipe is constructed to carry off the putrification fluids underground.

While the body is 'laying in' at the house, religious and non-religious activities, from scripture chanting to games go on continuously. All these activities serve to relieve the grief of those close to the deceased and none of the guests feel obligated to be solemn or show grief. On the contrary, they joke and laugh a good deal, as anything which will dispel gloom is approved. In short, funerals are festive affairs at which people are expected to enjoy themselves.

A day for the cremation has to be selected. If several people in the neighborhood have died, the first dead generally has priority. On

the morning of the cremation day a specific site has to be chosen. To accomplish this, an egg is thrown into the air at the cremation grounds. The place it lands becomes the site of the cremation. By this method it is thought that the will of the dead is made known. The pyre is constructed there and a path is prepared for the final procession.

The monks chant the last prayers in the home. Then one of those closest to the deceased takes up two midribs of banana leaves and touches one of them against the coffin. Then, with a knife, he cuts the midribs, signifying that all is ended between the dead and his survivors. The coffin is then taken up and carried in a procession to the cremation site, followed by chanting monks and all the relatives and guests, carrying donations for the monastery and torches for the pyre in their hands. Along the way they scatter rice and small coins. The coffin is not put down until the cremation site is reached. Though, if the way is long, the bearers are changed. From time to time the people pick up sticks of wood for the fire.

When the procession reaches the site, the coffin is carried three times around the pyre and set down. The last words are said over the body. Donations are made to the monks and the coffin is opened. The face is annointed with coconut oil and perfume. The relatives are permitted to look upon the face, which, it is thought, helps to end their sorrow. When they see the altered and disagreeable appearance of the corpse, the attachment to the physical husk dies and only memories of the spiritual qualities remain.

The body is removed from the coffin and placed on the pyre and the bands around it are cut. The coffin is broken up and placed on top of the corpse. A priest declaims briefly on the transitoriness of life and then starts the fire. All the guests file past throwing their candles and torches into the flames. Certain personal belongings of the deceased are burned too (though most of them are brought to the pyre, carried around it three times, and given to the monastery or the poor).

While the pyre is burning the people join in amusements such as boxing and conjuring tricks. When the flames reach the corpse, everyone stands aside and permits the relatives and close friends to view it. After the cremation, the guests visit the temple and wash their hands before returning home.

When the body is removed from the house everything is scrubbed. The ceremonies continue from one to three days more. Trays of rice are brought to the monks at the monastery every day. On the last of these days there are a religious service with chanting of the scriptures, feasting, and sport throughout the night.

The morning after the cremation, a protective thread is bound completely around the house. The priests and relatives go to the cremation site and dowse the embers if they are still hot. They gather some of the

bones and put them in an urn and they mold a human image from the rest of the ashes. They place the urn on the image with a burning taper on it. A priest delivers a homily on the brevity of life. The urn is covered and the rest of the ashes are buried at the cremation site. The urn is either deposited in the monastery or buried in the cemetery. A final prayer service at home concludes the ceremonies.

The length of time for funerals is not fixed. It may be as long as convenient, though it is not customary for it to last more than a year, even in the case of kings.

Usually after the next harvest a memorial service is held for the dead. This service, the last memorial, is called the 'Bunchaekkhao.' On the day appointed the relatives go to the temple and make donations of special food to the monks. There is a prayer service and a long yellow or red banner is placed in the temple grounds as a memorial.

One ceremony not mentioned before is the 'Kwaetkwai' held seven days after a death. The purpose of this ceremony is to determine the state of the person at the time of death and his possible future state. There is also a Thambun for the dead.

D. Customs of the Southern Region

1. The Chingpret. This is the 'autumnal' festival, marking the end of the rainy season, and celebrated for three days from the end of the tenth lunar month.

It used to be believed that on the last day of the tenth lunar month the spirits of the wicked dear were released from their bonds in hell and permitted to visit the world of men. On the second day of the eleventh month they return to hell. On the first day of this festival the people gather in the temples to participate in Thambun ceremonies for those doomed in hell. On the last day the ceremonies are performed again, this time to hasten the spirits back to hell.

For these ceremonies the people bring rice cakes to the temple and place them in certain kinds of containers as offerings to the dead. Afterwards everyone takes out a piece of the cake and eats it. Then there is a prayer service.

In some places for amusement there is a custom in which people place promissory notes and coins on top of posts two or three meters high. The sides of the posts are greased and anyone who wants to get the money has to climb the post -- no easy task. It is also a custom to dress children up in new and brightly colored clothes for this festival.

2. The Chakphra. The Chakphra festival is one of the biggest and merriest in the Southern Region. The festival, starting from four to five days

End

before Chakphra day, is one of the principal occasions for boys to meet girls.

The story behind this festival is as follows. The Buddha ascended into the second tier of heaven at the beginning of one Lent and preached to the angels and to His mother. He returned to earth at the end of Lent, to the great joy of the people who flocked to Him with gifts of food. The crowd was so great that those in back could not get close enough to hand their gifts to Him personally, so they wrapped the gifts in leaves and threw them. Thus, today, people send gifts of food wrapped in leaves to the temple in memory of the Buddha's return.

Seven days before the Chakphra, the public is informed of the advent of the festival by the beating of two drums, one pitched high and one low. The drums are beaten night and day according to a prescribed sequence and rhythm.

Two or three days before the Chakphra the monks and people gather in the temple for the 'transportation' of the enshrined image of the Buddha. If the area is near a body of water, the transportation is by boat. If there is no water nearby, a unique, large vehicle, in two sections, is constructed. The first section is made into a representation of the two heads of the Serpent King and the second section a representation of its tail. The carved wooden body of the serpent is covered with colored glass and flags are placed in the corners of the vehicle. The image of the Buddha is placed in the vehicle together with several monks with drums and bells. The vehicle is drawn along the road by cables. In the case of water transportation the boat is pulled by another craft.

The vehicle (or boat) is brought to the selected place -- usually not very far away. The procession is accompanied by a large crowd of people of all ages, shouting and laughing all the way. Drums are beaten to pace and encourage those hauling the vehicle. When the vehicle reaches the destination the people give a great shout. Then the vehicle is pulled back to the temple. In some areas several temples and monasteries participate in a single festival.

In addition to this enjoyable ceremony, in many places the people hold boat races and 'Sat ton.'

In the 'Sat ton' or rice fight the participants prepare balls of sticky rice. Sometimes the rice is mixed with sand. Equipped with a supply of thirty to forty rice balls, the combatants stand eight to twelve meters from each other and throw. More points are given for hits on certain parts of the opponents body, such as the face, chest, and abdomen. The one with most points at the end is the winner. This sport is usually held at the end of Chakphra.

Villages near the water hold boat races. The route usually corresponds to that of the previous image transportation. In some places women are allowed to participate.

The Chakphra is held during the eighth lunar month.

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